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A STUDY OF ALTERNATE APPROACHES TO
UTILIZATION REVIEW OF LABORATORY SERVICES
WITHIN AN ARMY MEDICAL CENTER

A Graduate Research Project
Submitted to the Faculty of Baylor University
in Partial Fulfillment of the Requirements for the Degree of
Master of Health Administration

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By

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TABLE OF CONTENTS

	Page
LIST OF TABLES	iv
LIST OF FIGURES	v
CHAPTER	
I INTRODUCTION	1
Development of the Problem.	1
Review of the Literature	17
Research Methodology.	39
II DISCUSSION.	44
Analysis of the Current Utilization Review Framework Within BAMC	44
Assessment of Need Within BAMC	47
Profile Analysis.	51
Review of Suspected Overutilized Tests.	54
Peer Review of Laboratory Test Utilization	55
Scheduled Test Review	57
Analysis of Methods Against Study Criteria	58
III CONCLUSIONS AND RECOMMENDATIONS.	61
Conclusions.	61
Recommendations.	62
APPENDICES	
A Ancillary Services Utilization Review Questionnaire for Department and Service Chiefs.	64
B Ancillary Services Utilization Review Questionnaire for Pathology Staff and Resident Physicians.	70
C Worksheet for Analysis of Questionnaire Responses	73
D Spearman Rank Correlation Coefficient Analysis	80
E Medical Record Audit Form	83
F Peer Review Worksheet	85
G List of High Cost, Low Cost, and Scheduled Laboratory Tests Performed at BAMC	87
H Analysis of Questionnaire Responses.	97



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APPENDICES (Cont.)

Page

I	Ten Most Frequently Ordered Laboratory Tests and the Spearman Rank Correlation Coefficient Calculation	104
J	Results of Medical Record Audit of Suspected Overutilized Tests . .	110
K	Peer Review Medical Audit	113
L	Review of Scheduled Test	116
M	Proposed Appendix to the BAMC Institutional Agreement	121
N	Proposed Addition to Appendix B of BAMC Memorandum 40-1, Quality Assurance	125
FOOTNOTES		127
BIBLIOGRAPHY		131

LIST OF TABLES

Table		Page
1	Externalities with Potential Resource Implications upon Army Medical Centers	5
2	Summary of Causes of Avoidable Hospital Days.	22
3	Performance Standards	24
4	Types of Information to be Recorded Under Course of Treatment .	25
5	Factors Contributing to Excessive Use of Laboratory Tests in the Teaching Hospital.	35
6	Development of Educational Strategies to Promote Optimal Use of Laboratory Services	36

LIST OF FIGURES

Figure		Page
1	Relating the Army Medical Center to Its External Environment . . .	9
2	Brooke Army Medical Center Total Expenditures	10
3	A Conventional Concurrent Ancillary Service Expenditures	12
4	A Conventional Concurrent Review System	21
5	Flow Diagram of the Audit Process	29
6	Study Design	40
7	The Hierarchical and Matrix Organizational Framework for Ancillary Services Utilization Review	48

CHAPTER I

INTRODUCTION

Development of the Problem

Brooke Army Medical Center (BAMC), located at Fort Sam Houston, Texas, has developed a worldwide reputation for excellence since its simple beginnings in 1876 as a hospital supporting a cavalry outpost. BAMC is known for its high quality of patient care and the graduate medical education, training, and research programs which have positively influenced the science and art of medicine as well as the health of millions of people.

Today, BAMC provides primary, secondary, and tertiary medical support to the eligible beneficiaries of the Department of Defense. A Health Services Region, consisting of most of the state of Texas and all of the states of Arkansas, Louisiana, and Oklahoma, is served. BAMC also acts as a worldwide referral center for inpatient care and laboratory services. The patient care delivery mission is accomplished with high state-of-the-art medical technology, including cardiac catheterization, open heart surgery, radiation therapy, and a multitude of diagnostic services. Over 19,000 admissions and 1,110,000 outpatient visits were experienced in 1982. This workload generated 5,901,892 laboratory procedures, 137,140 diagnostic x-ray procedures, and 6,000 computerized axial tomography procedures.

Graduate medical education is offered in twenty-two different residency and fellowship programs. In addition, there are seven categorical and one flexible first-year graduate medical education programs conducted. All are accredited by their respective accrediting bodies in recognition of their academic excellence. Affiliation agreements are maintained on a nationwide basis.

BAMC also conducts a nine-month dietetic internship, supports the Army-Baylor Master's Program in Physical Therapy, conducts a one-year pharmacy residency program

and provides an administrative residency opportunity to students completing requirements for a Master's Degree in Health Care Administration from the Army-Baylor Program in Health Care Administration. Clinical rotations and training are provided to medical students from the Uniformed Services University of the Health Sciences, the University of Texas Health Sciences Center, and to medical students in the Health Professional Scholarship Program. Externships are also provided to optometry students from schools across the nation.

Training programs include an Operating Room Nurses Program and an Intensive Care Unit Nursing Program for Army nurses, a clinical rotation program for uniformed service physician assistants, and two medical Military Occupational Specialty (MOS) schools for enlisted service members. BAMC is a clinical rotation training site for several other medical MOS-producing programs of the U.S. Army Academy of Health Sciences, which is also located at Fort Sam Houston.

The research program within BAMC is managed by the Department of Clinical Investigation. Over two hundred protocols are active at any given time. Research relationships are maintained on a worldwide basis.

Given the magnitude of the missions of patient care delivery, graduate medical education, medical training, and research, there are many resource management implications, not the least of which is utilization review. BAMC was surveyed in March 1982 and accredited for three years by the Joint Commission on Accreditation of Hospitals (JCAH) in recognition of its excellence and adherence to the JCAH standards. One negative finding of the survey team was that BAMC did not possess a utilization review plan.

Recent events in developing a utilization review plan led the researcher to question whether a program for utilization review of laboratory and radiology services could be developed for use within BAMC and other Army Medical Centers. Not only is there a potential benefit to be gained in cost containment for BAMC alone, but if sound utili-

zation resource management practices are imbued in physicians participating in the various graduate medical programs, there is potential cost containment benefit to be gained when these physicians completing programs disperse to practice in Army Medical Department (AMEDD) facilities throughout the world. The leading question is whether there is a need to develop such a program. Several other questions logically follow if there is a need: What do the ancillary services programs in the civilian sector look like? How can various program components be integrated into an Army Medical Center? How can the program benefit graduate medical education? What will the program look like? The benefits to be gained are improved resource management practices within the medical center, as well as improved graduate medical education and cost containment without sacrifice of quality of patient care.

This graduate research project will examine external environmental factors implicating the need for utilization review of ancillary services within an Army Medical Center. (Hereinafter the term "ancillary services" will be intended to mean laboratory, pharmacy, and radiology services collectively.) It will also assess the BAMC internal environment for utilization review of ancillary services, propound a statement of the problem, provide definitions of terms to be used, define the study's objectives, describe the criteria for an effective program, give assumptions made, and consider the study's limitations. Once the foregoing matters are established, a review of the literature and a proposed research methodology will be provided. The research methodology will include a questionnaire analysis, an analysis of the internal organizational framework, a profile analysis, medical audits to objectively review usage of two laboratory tests, a diagnosis-based peer review of laboratory study utilization, a review of a laboratory test requiring scheduling, an analysis of results against criteria, and a formulation of suggestions for implementation of proven methods.

The External Environment

There are a multitude of forces and factors impacting upon an Army Medical Center from the external environment. Table 1 lists a number of the forces at work which have resource implications. The list is not all inclusive. Utilization review in the civilian sector has evolved from the late 1960s in response to many of these factors, the most prominent being the Medicare and Medicaid legislation and reimbursement mechanisms. The early utilization review programs attempted to control payments and reduce payment abuses. To fulfill conditions of participation, hospitals formed committees to review services provided to Medicare or Medicaid beneficiaries by medical care evaluation studies, admissions review, and extended care reviews compared against established criteria.¹ While governmental and other third party influences increased, the JCAH responded to the changing trend by adopting a utilization review standard that was applicable to all patients without reference to mode of payment. Traditional responses to JCAH overview within Army Medical Centers (MEDCENs) has been that the utilization review standard is not applicable to the MEDCEN since it is not reliant on third party reimbursement. The JCAH surveyors have recently been rejecting the traditional response, leading to impetus for change and more attention being given to utilization review.

While facing many of the factors in Table 1, the AMEDD is also facing an aging of the military population served. Michael D. Bromberg, Executive Director of the Federation of American Hospitals, has pointed out some startling facts about the nation's population:

- From 1980 to 2000, the fastest growing age group will be those over 85.
- By the year 2000, 32.7 million people will be over 65.
- Fifteen percent of the population will be in the 40-49 age group in 1990.²

Thus, the aging of the military community, the sophistication of services needed

TABLE 1

Externalities with Potential Resource
Implications upon Army Medical Centers

TRENDS OF HEALTH CARE DELIVERY

- Military Environment
 - Total Army
 - AMEDD Goals
 - Higher HQ
 - Other USMTF
- Civilian Environment
 - Industry Composition
 - Reactions
 - Plans
 - New Directions

JCAH/OTHER ACCREDITING BODIES

- Accreditation Requirements
- Quality Assurance
- Utilization Review

HOST INSTALLATION

- Population Mix
- Expectations
- Services Provided
- Services Needed

FEDERAL PROGRAMS

- Philosophy
- Congressional Activity
- Budget
- Median for Above
- National Regulatory Agencies

EDUCATIONAL AGENCIES

- Peers
- Accrediting Bodies
 - Standards
 - Criteria
 - Accreditation

STANDARDS OF PRACTICE

- Civilian Peers
- Military Peers
- National & Local Regulatory Agencies
 - Compliance
 - Reporting--PM, Vital Assistance
 - Certificate of Need

RESOURCE MANAGEMENT

- Current Practice
- Studies--Productivity, etc.
- Future Direction
- Reimbursement Formulas
 - Prospective
 - Case Mix
 - Diagnostic Related Group
 - Diagnostic Care Composite Unit

PATIENT POPULATION

- Changing Mix--Aging
- Expectations
- Meeting Demand within Constraints
- Media Impact

FEDERAL OVERVIEW & AUDIT

- | | |
|--------|----------|
| • AAA | • NRC |
| • PSRO | • OSHA |
| • GAO | • DOD HA |
| • PRO | • Others |
| • CBO | |

POLITICAL ENVIRONMENT

- National
- Local
- State

HISTORICAL EXPERIENCE OF OTHERS

by the elderly, and the resulting costs will put greater pressures on AMEDD health providers to explore more efficient and effective methods of care delivery. The dwindling dollar available for AMEDD medical care may require more financial contributions from patients toward the cost of their care. Are we currently guarding against over- and underutilization to protect entitlements due these beneficiaries? We certainly should insure that we are.

Current studies, such as the Uniform Chart of Accounts and the Uniformed Staffing Methodologies, as well as efforts toward finding a more reliable workload measure than the current Medical Care Composite Unit for budgetary use, are certain to change budgetary thinking within the AMEDD. These studies and the recent increase of activities at Department of Defense Health Affairs, i.e., adding a quality assurance overview activity, point to the Defense Department's medical delivery system being standardized and hence more vulnerable to legislation similar to the Tax Equity and Fiscal Responsibility Act (TEFRA) signed in September 1982.

TEFRA will reduce Medicaid and Medicare expenditures over the next three years by \$14 billion. It extended the Health and Human Services Secretary's discretionary authority (section 223 limits) to all ancillary services; eliminated the eight percent nursing differential for the aged, the private room subsidy, and one hundred percent reimbursement of radiologists and pathologists in hospitals; reduced amounts paid to assistants in surgery; and developed new reimbursement formulas for hospital-based physicians.

Each hospital will have a cost target established for it. The cost target is calculated by dividing the Medicare cost for the previous year divided by the number of Medicare discharges to obtain a cost per discharge. The cost per discharge will be multiplied by an allowed percentage increase for inflation to obtain a cost target per discharge. If the hospital cost is under target, it will be allowed to retain five percent as an incentive payment. If the hospital exceeds the target, it will be reimbursed only

twenty-five percent of its cost in excess of the target.³

A prospective reimbursement system for Medicare and Medicaid is becoming more of an eventuality with each passing legislative day. The implication is that the AMEDD may soon be subjected to the same or a similar reimbursement mechanism.

Why did these patterns emerge? The reason is largely one of changing public and federal philosophy. The public does want high quality medical care, but regards taxation and the federal budget as being onerous. There is diminishing willingness to pay for maintenance of the quality of life and health care of others when the middle income family finds its monthly disposable income decreasing while its tax burden increases. The media is also having an impact on the public. Hardly a day passes without mention of a health care issue in the newspapers and/or on the television evening news. As the media coverage increases, so does the education of the health care consumer, who formerly submitted to the mystique of medical practice and the veritable omnipotence of the physician and other health care providers. The change in public philosophy and concomitant awareness increase only underscores the health care industry's accountability to its patient public and potentially enhances its effectiveness.

This change in public policy has caused a redirection of federal philosophy as it reviews entitlement and need programs in light of budgetary limitations, costs, constituent demand, and inflation. At federal levels there is changing regulation, changing reimbursement formulas, and increasing attention to DOD budget requests. Evidence of justification and proper management plans and practices are required more now than ever before. As a result, the AMEDD facility of today is subject to heightened overview, audit, and justification of its needs.

The MEDCEN must change to meet these dynamic externalities. The MEDCEN must control its costs by increasing staff awareness and instilling utilization review activities into all facets of care presenting the opportunity for improvement. Ancillary services and graduate medical education promise to be two of the instant areas to

address. By teaching resource management skills, not only may the MEDCEN make a measurable impact on its internal cost containment practices, but it may also have a long range impact on cost throughout the AMEDD as graduate medical education students conclude their training and disperse to practice.

The Internal Environment

The external factors alone make management of an organization seemingly impossible. The Army MEDCEN has an organizational linkage to its external environment in the form of the organization's mission and command group (see Figure 1). The mission describes the organization's direction and forms the basis of programs and activities. The command group delineates the goals and objectives and sets up monitors, measures, and initiatives to be accomplished in support of the goals and objectives. Initiatives are carried out through the actions of internal managers in the hierarchical organization with the assistance of committees, the Inspector General, the special staff, and other management tools.

Other management tools could include planning, programming, and budgeting; risk management, credentialing, patient care evaluation, and utilization review components of the quality assurance program; public relations; patient education; preventive medicine activities; and middle manager reliance and development, among others. The important point to note is that the command group assesses the impact of externalities upon the organization, assesses the internal organization in light of the mission, and makes the necessary adjustments to relate the organization to the environment. Utilization review is one tool among many that the command group and internal managers may use in insuring the organization's continued viability.

BAMC's last four years of budgetary experience is shown in Figure 2. Note that over that period, ancillary services costs have increased from 17% to 18.7% of the budget. Also during that time period, ancillary services expenditures increased 93.7% for

ORGANIZATIONAL LINKAGE TO ENVIRONMENT

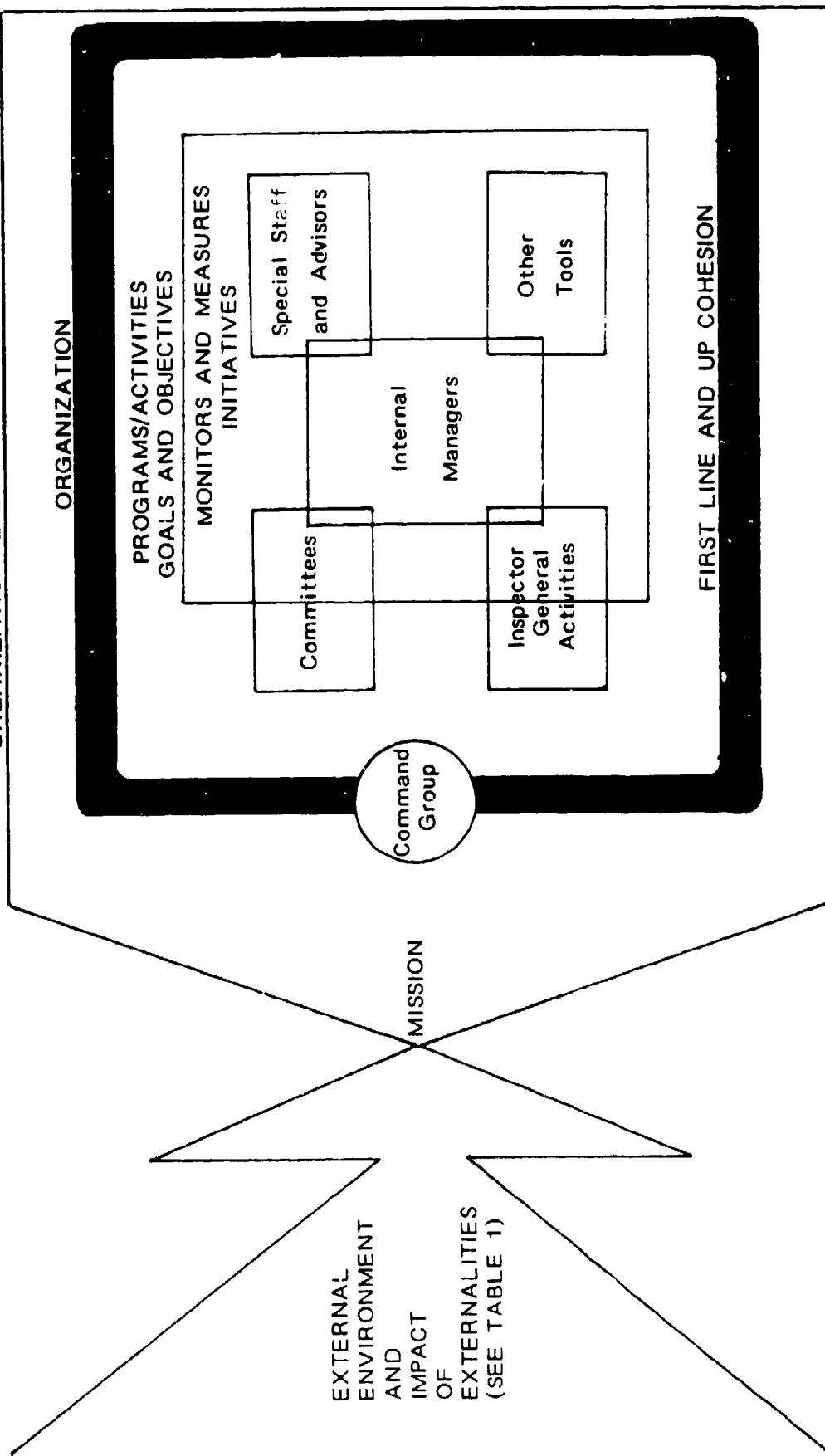


Figure 1. Relating the Army Medical Center to Its External Environment.

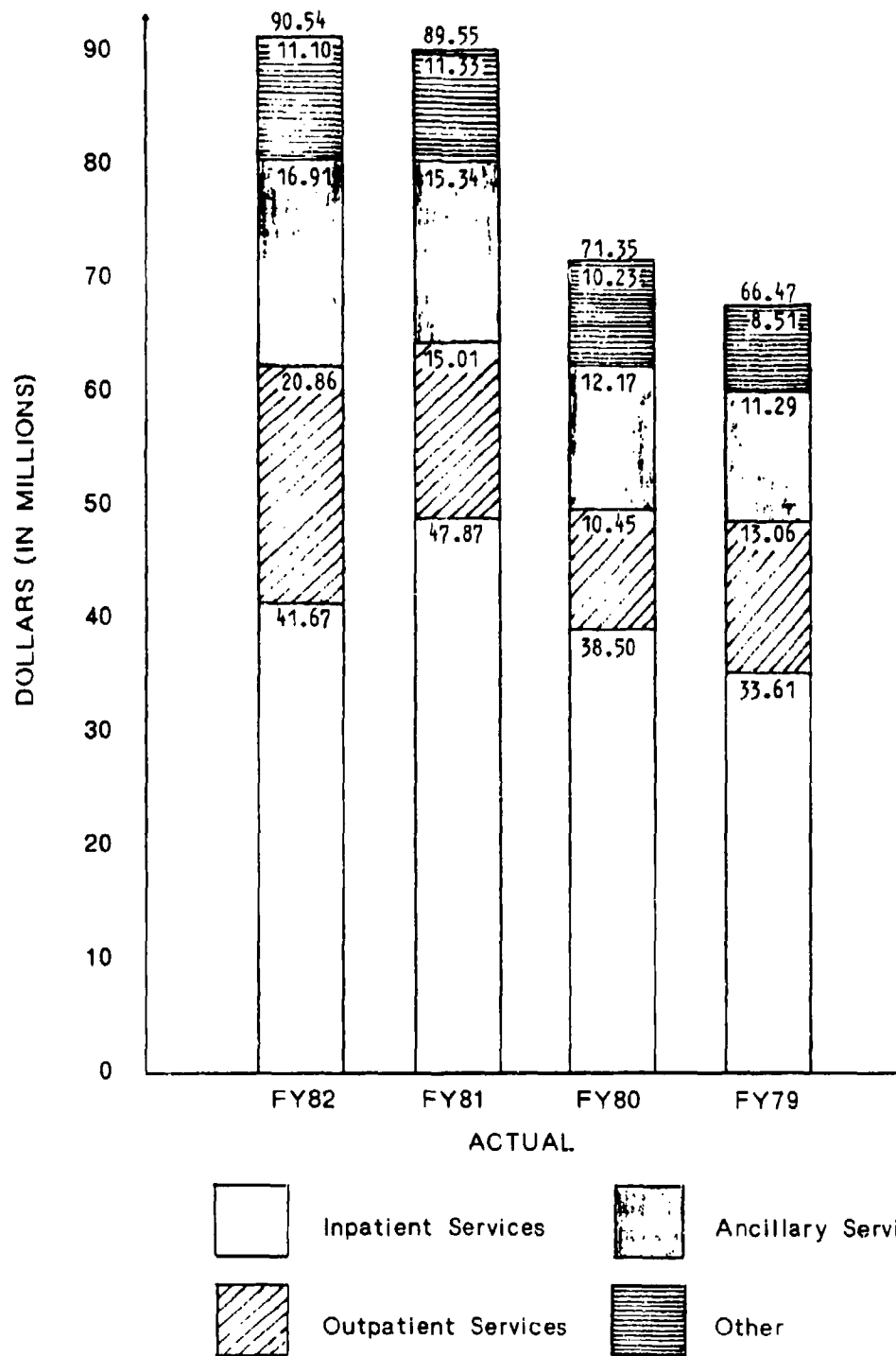


Figure 2. BAMC Total Expenditures*

* Patient Care Expenses Report, FY 79, 80, 81, and 82. Brooke Army Medical Center, RCS: MED-304(R1).

each bed day and 18.7% for each outpatient visit. The change in supply expenditures between fiscal years 1982 and 1983 for the laboratory showed an increase of 41.3%. Radiology demonstrated a supply expenditure increase of 35.5% for the same period of time.⁴ (See Figure 3.)

BAMC has averaged 246 students in graduate medical education and 50 students in first year postgraduate study for the last four years. If the 178 staff physicians of BAMC are added to the student figure, this represents a large force having measurable impact upon resource management in providing patient care.

BAMC and other MEDCENS need utilization review tools to assess the use of ancillary services. The purpose of this project is to develop a generic utilization review framework for the ancillary services and to use the information generated in resource management practice and graduate medical education programs.

Statement of the Problem

The problem is to collate, design, and test the best approaches to utilization review of ancillary services which are widely applicable and to enhance the quality of graduate medical education at Brooke Army Medical Center.

Definitions

Audit is a review, evaluation, and/or assessment of medical records, reports, and other appropriate sources to measure the quality of patient care and/or resource management. It is used to assess the medical treatment facility's capability and professional practice patterns as well as find and correct any problems or patterns of deficient care.

Concurrent review is an assessment of health care delivery during the process of care to find deviations from standards, criteria, and norms. It is possibly the most effective of the review mechanisms, since corrections of deficient care patterns may

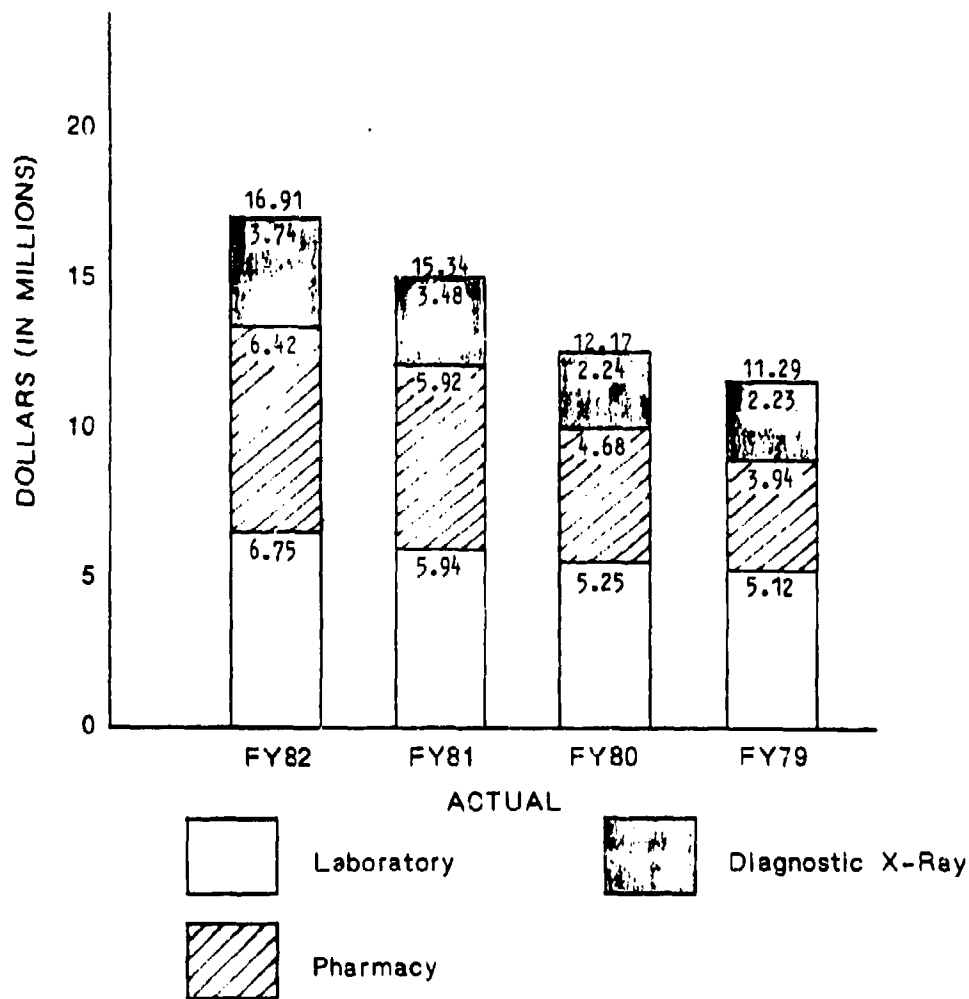


Figure 3. BAMC Ancillary Services Expenditures.*

*Patient Care Expenses Report, FY 79, 80, 81, and 82. Brooke Army Medical Center, RCS: MED-304(R-1).

take place on a timely basis thereby increasing learning and enhancing preventive measures.

Criteria are predetermined elements against which aspects of the quality of a medical service may be measured.⁵

Deficiency is a nonjustifiable variation from expected standards.⁶

Norms are numerical or statistical measures of usually observed performance.

Peer review is the evaluation of a health professional by colleagues; it is an evaluation of the quality and efficiency of the services that the health professional ordered or performed. It is an auditing method which can be treated as a part of graduate and continuing medical education to correct deficiencies found during audit and to provide feedback to the professional staff.

Profile analysis is the examination of aggregate health service data in a format that reveals patterns of care over a given period of time. It may be used as an alternative or supplement to retrospective review, because it identifies overall patterns of care needing correction rather than singling out individual records.⁷

Prospective review is an assessment of the quality and/or nature of health care services that should be rendered before the care event. It is a formulation of standards, criteria, and norms from the literature or from expert opinion of what the course of care for a specific condition should entail.

Retrospective review is an in-depth assessment of the quality and/or nature of the utilization of health care services performed after the patient has been discharged. It is a review that takes place after the care event and measures the outcome against established standards, criteria, and norms.

Standards are professionally developed expressions of the range of acceptable variation from a norm or criterion.

Variation is an event care, happening, or other matter which is not in agreement with the norm or standard. A variation may either supersede the norm (e.g., acceptable care) or fall short of the norm (e.g., unacceptable care).⁸

Utilization review is the ongoing evaluation of resources management. This review includes the appropriateness of admissions, services ordered and given, length of stay, discharge planning and practice, and use of outpatient services. The aim of this review is cost containment.⁹ It is designed to insure the appropriate allocation of resources in delivery of high quality care in the most cost effective manner. It will address

overutilization, underutilization, and inefficient scheduling of resources.¹⁰

Objectives

The objectives or intermediate tasks used to solve the problem are to:

1. Study the current literature to find methods that others have successfully used in utilization review of ancillary services. This review will assess successes and opportunities for linkage of utilization review activities to graduate medical education. This objective will be accomplished and reported in the review of literature section of this chapter.
2. Define the current framework existing within BAMC which addresses utilization review and provides opportunities for heuristically applying ancillary services utilization review.
3. Design a questionnaire and forward it to the service and department chiefs with teaching responsibilities. The purpose of the questionnaire is to determine if there is a majority consensus of need for utilization review of ancillary services within Army MEDCENs, what criteria should shape the system, what laboratory tests are suspected of overutilization, what tests requiring scheduling delay patient treatment, and what ten tests are most frequently ordered. The Pathology Department Chief will also be asked to complete the same questionnaire. A second questionnaire will be directed to the pathology staff and residents. A comparison of the responses will be accomplished.
4. Perform a profile analysis on selected overutilized tests, the leading scheduled test that causes patient treatment delays, and the ten most frequently ordered tests. The profile analysis of the ten most frequently ordered tests will then be compared against questionnaire responses by different groups of physicians to determine if their responses follow historical data.
5. Develop criteria using expert opinion to study two of the suspected

overutilized tests identified by questionnaires and profile analyses. The criteria will be refined by a pre-test on a small sample of records. A medical audit will be performed using the criteria.

6. Accomplish a peer review of the ten most frequently ordered tests identified through the questionnaires and profile analyses.

7. Assess the leading scheduled test causing patient treatment delays which was identified through the questionnaires and make recommendations for scheduling improvement.

8. Analyze the success of the utilization review methods against the criteria of this study.

9. Suggest ways to integrate successful ancillary service utilization review methods into the organizational framework and graduate medical education programs.

Criteria

The methods adopted to be used for utilization review of ancillary services must be:

1. Simple, logical, and inexpensive.
2. Accomplished within existing personnel resources.
3. Dependent upon the presence of medical judgment.
4. Capable of enhancing resource management education within graduate medical education programs.
5. Designed to meet Army regulatory and JCAH standards.

Assumptions

Assumptions are constraints or strong probabilities which have potential impact upon this study. The assumptions include the following:

1. No additional personnel will be allocated for the utilization review

function from resources in the MEDCEN.

2. Most information upon which to base a comprehensive utilization review program for ancillary services can be gathered from existing information resources within a MEDCEN.

3. The existing committee structure within a MEDCEN may be modified if there is a need to do so.

4. Utilization review activities that include peer review will stimulate resource management education for both graduate medical education students and staff and will have cost containment impact upon already scarce MEDCEN resources.

5. Methods developed for review of laboratory services will be generically applicable to the utilization review of radiology services.

6. Since a viable drug utilization review program exists at BAMC, it need not be addressed as a part of this study.

Limitations

Limitations upon the study are resources that are not available to the researcher for use in studying the problem. The following limitations are operative:

1. No additional personnel will be available to implement the utilization review program for ancillary services once it has been formulated. Therefore, there must be an overt effort to minimize complexity and reporting.

2. Automation resources for data collection and information processing are not available to those implementing a program of utilization review of ancillary services.

3. Some information which would enhance this study and resultant utilization review activities may not be available in the form desired.

4. Some cost information needed for analysis of particular ancillary services may not be available, due to varying accounting methods, e.g., differences in accounting for Operating and Maintenance--Army (OMA) and Military Pay--Army (MPA), not accounting for depreciation, etc.

REVIEW OF THE LITERATURE

Impetus for Utilization Review

A recent public survey showed that Americans want the best available care despite its increasingly high costs. When asked to rank the reasons for high costs, those surveyed ranked fraud, waste, and abuse in federal medical programs highest, followed by hospitals and physicians. Only two percent of those polled felt that access to advances in health care should be offered only to those able to pay for it. Sixty-one percent believed that everyone should have access to the same advances.¹¹ This, even though a small sampling, is a social contract imperative for federal program managers, hospital administrators, and physicians to heed and address with improved resource consciousness and management practices.

An attitudinal survey was conducted by Rothberg and Gertman to determine the degree and kind of unnecessary utilization in hospitals as estimated by hospital administrators and hospital review chairpersons. A sizeable majority of respondents indicated their feeling that some unnecessary utilization existed in the nation's hospitals. Specific services or areas identified were hospital admissions, hospital stays, and ancillary services. The levels of agreement between the adversarial parties surveyed led the authors to conclude that rigorous inspection of hospital admissions, stays, and ancillary services have merit and should be continued.¹²

Hospitals are responsible for forty percent of the national costs of health care, which in 1979 amounted to nine percent of the gross national product. Some expenditure increases are attributed to price inflation and population growth. Nonetheless, as managers of patient care, physicians bear the major responsibility for determining

levels of hospital expenditure. Physicians purchase for patients by admitting and discharging patients and by ordering such services as laboratory tests, x-rays, nursing services, pharmaceuticals, critical care, and surgery. Because of their role in managing patient care and influencing expenditures, physicians offer an opportunity for discrete control of medical care costs.¹³

Applicability to the AMEDD

Increasing federal and other third party payer interest has resulted in utilization review coming of age since its beginnings with Medicare and Medicaid legislation in the late 1960s. The JCAH has adopted a utilization review principle that hospitals shall provide for appropriate allocation of resources through an effective program that insures that high quality care is provided in the most cost effective manner. The hospital's program must address overutilization, underutilization, and inefficient scheduling by adherence to a written plan which is approved by the medical staff. The plan must, in addition to delineating responsibilities, provide for a conflict of interest policy, a confidentiality policy, methods of problem identification, a concurrent review mechanism, and a mechanism for discharge planning. The utilization review committee must also examine findings of related quality assurance activities.¹⁴

The AMEDD subscribes to the principles and standards of the JCAH and requires that facilities be accredited.¹⁵ The Army's utilization review program outlined in AR 40-66 calls for facilities to review the appropriateness of admissions, services ordered, length of stay, discharge planning practices, and outpatient services with an aim of cost containment. The program will review resources management practices, the availability and alternate use of ambulatory services, and the long term patient roster.¹⁶ Utilization review is one component of the facility's quality assurance program. The other minimal components are credentialing, patient care evaluation, and risk management.¹⁷

Effective utilization review can be helpful in ensuring appropriate allocation of resources, whether the resources are a hospital bed, a pharmaceutical, or a diagnostic test. The utilization review committee should address itself to the patterns of resource utilization and identified scheduling delays. An analysis could be done, for example, on unnecessary extensions of the length of stay due to failure to order or schedule a laboratory test or x-ray procedure. Close liaison should be established between the utilization review, medical audit, education, credentialing, and other associated committees for the purpose of exchange of information, in order to avoid duplication of effort and failure to take appropriate action.¹⁸

Palmer and Nesson report two practical constraints for internal quality assurance programs in ambulatory care which are equally applicable to utilization review. First, the cost of care, as well as effectiveness, must be taken into account when writing criteria by which providers evaluate their success in delivering appropriate care to their patients. Secondly, the program must not be too costly. Even so, health delivery organizations spend far less money, time, and effort on QA than do industrial enterprises. Health care decision makers are reluctant to divert resources from direct patient care to QA, because they generally lack conviction that dollars spent on QA yield commensurate benefits to patients. To stretch dollars, QA programs and concomitant utilization review programs should rely on routinely available data sources and intervention mechanisms, rather than special data collection efforts and superimposed or duplicative operations.¹⁹

Selected Methods

Retrospective utilization review lends itself to a problem-focused approach and may be the method of choice in many instances. Various considerations may be present to indicate the appropriateness of a retrospective approach. First, if a problem is identified or suspected concurrently, a retrospective review may be useful to determine

the cause or the scope of the problem. Second, retrospective review could be the method of choice if an investigation of an identified problem requires only a sampling of patient records and this sample would not be conveniently available for concurrent analysis. Third, retrospective utilization review may be done to investigate a problem in diagnosis, where concurrent review is no longer conducted for a particular diagnosis or patient circumstance. A fourth instance would be if a service appears to be over-utilized or underutilized, or, if delays in scheduled services occur, scheduling practices may be inefficient and may require examination. Since concurrent review could disrupt care, retrospective review may be the method of choice. Lastly, the utilization of various tests, drugs, or treatments for a given diagnosis may be best examined through retrospective review, because treatment would be complete and outcomes known.²⁰

The first step in retrospective review would be to identify a known or suspected problem and define it in such a way that measurable criteria may be developed for reviewing it. Once the criteria are developed, several patient records should be reviewed to determine the appropriateness of the criteria and their clinical validity. A checklist could be organized to enhance the efficiency in carrying out the review process. A sample of records could then be selected and reviewed for compliance with the criteria. Results will require careful analysis. A profile analysis could point out the cause or source of a problem. If the profile analysis indicates a specific provider, service, ward, or procedure to be the focus of a problem, the entire facility need not be involved in the corrective action. Accordingly, recommendations for corrective action should be specific to the source of a problem. Review findings should then be summarized in a report that can be shared with appropriate personnel. The report should summarize recommendations for corrective actions and plans for follow-up actions. Thus, retrospective utilization review may be the method of choice if a problem is best addressed through a sampling of completed records.²¹

Concurrent review is a monitoring tool for measuring processes or procedures that

should take place if the patient care system is to be effective. The benefit of measuring the process close to the time that it takes place is that corrective action can be immediately taken to solve the present problem and preclude its repetition. A concurrent review system can provide useful information to a number of departments throughout the hospital. It can assist in determining the patterns of resource allocation in the hospital and it can assist in correcting deviations from acceptable practices. Minimally, concurrent review generates sufficient data on process systems to pose appropriate questions, even if value judgments cannot be made close to the event of care.²² A conventional concurrent review model is depicted at Figure 4.

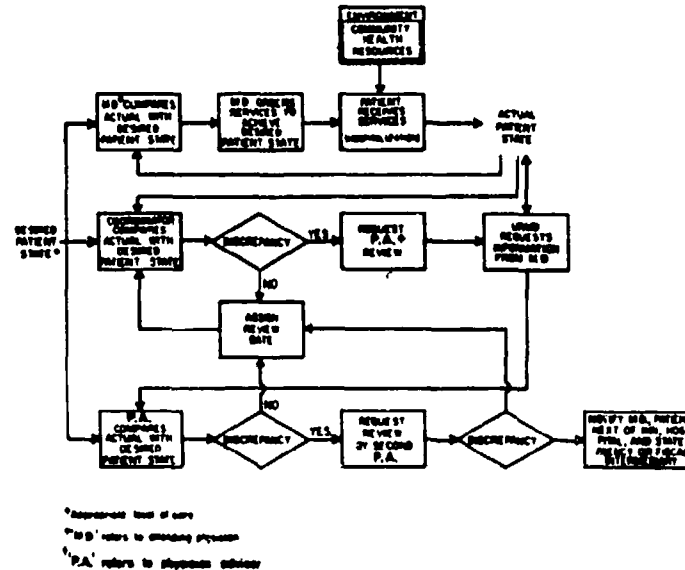


Figure 4. A Conventional Concurrent Review System.*

*Restuccia, Joseph D. "The Effect of Concurrent Feedback in Reducing Inappropriate Hospital Utilization." *Medical Care* 20 (January 1982): 49.

Edwards stated that identification of the specific causes for avoidable days of hospitalization is the starting point for developing corrective programs. Critical delays in the course of care can be broadly categorized, as shown in Table 2.²³

TABLE 2

Summary of Causes of Avoidable Hospital Days

• MEDICAL

1. Physician management
 - a. Delays in ordering something on the critical path
 - b. Delayed discharge
2. Part or all of treatment could have been on an outpatient basis
3. Consultation delays on the critical path
4. Inadequate pre-admission scheduling
 - a. Of diagnostic work-up
 - b. Of operating room time
5. Other

• ADMINISTRATIVE

1. Diagnostic radiology
2. Nuclear medicine
3. Clinical laboratory/pathology
4. Surgery delays
 - a. Operating room scheduling preferences
 - b. Operating room capacity constraints
 - c. Cause not known
5. Outplacement
6. Administrative discharge delay
7. Other (EKG, EEG, etc.)

• OTHER

1. Patient/family pressure
2. Teaching
3. Research

Timeliness of care and discharge can be measured against prospective performance standards similar to those depicted in Table 3. Standards for a facility should be developed by working with department chiefs responsible for key diagnostic and therapeutic services. The purpose is to determine which diagnostic and therapeutic services extend length of stay and delay care if not performed in a timely fashion. Performance criteria reflecting the hospital's accepted standards are then set for these procedures. The standards should reflect realistically achievable improvement targets.²⁴ The standards are then reviewed against types of information that are to be recorded on a patient under a course of treatment. Types of information to be recorded are shown in Table 4.²⁵ To assess the potential for reducing inappropriate hospitalization, delays in a course of treatment that prolonged length of stay must be distinguished from those that did not. The following questions help establish whether delays in the care process did extend the length of stay:

1. Were delayed test results critical to the next step or to continuation of the patient's active treatment?

2. If there were delays in completing specific procedures, did the necessity for ongoing therapy or treatment to alleviate the patient's illness during this period offset any impact the delays might have had on the length of stay?²⁶

Gertman and Restuccia also designed a protocol for assessing unnecessary days of hospital care. Of the twenty-seven objective criteria classified into categories of medical services, nursing life support services, and patient condition factors, over one-third of the criteria associated with a necessary day have diagnostic testing implications.²⁷ It is clear that diagnostic testing is vital to appropriate medical care delivery, is costly, and should be monitored closely.

Utilization Review of Ancillary Services

Recent literature documents an increase in the utilization of laboratory tests

TABLE 3

Performance Standards*

Medical and surgical	Neuro/Psychiatric
1. Physician ordering a test, procedure, consultation, or referral as soon as clinically indicated: same day, or first weekday after last diagnostic decision or test result	1. First medical evaluation: within 24 hours of admission
2. Laboratory tests, diagnostic X-ray, EKG, EEG return	2. Final diagnosis made: within 3 to 14 days following admission
a. Routine lab tests and X-ray: same day if ordered in a.m. or next weekday if ordered in p.m.	3. Consultations and referrals: same day as ordered or next weekday
b. Special X-ray, EKG, and EEG: same or next weekday	4. Outplacement: delay, if any, is counted from the day after disposition request is noted except where unusual arrangements involved
c. Special lab tests (cultures, Australian Antigen): 1 week, or as indicated	5. Discharge, medical: as soon as final diagnosis is made, patient is physically/mentally stabilized, and medication is on maintenance dose
3. Consultations and referrals: same or next weekday	6. Discharge, administrative: 1 day after discharge order is written
4. Operative procedures: delay, if any, is counted from next operating room day available to service following decision to perform surgery unless patient situation (e.g., delay in signing consent form, medical complication) interferes	
5. Outplacement: delay, if any, is counted from the day after disposition request is noted except where unusual arrangements involved	
6. Discharge, medical: as soon as final diagnosis is made, patient is physically/mentally stabilized, and medication is on maintenance dose.	
7. Discharge, administrative: 1 day after discharge order is written	

* Edwards, Arch B. "Care Levels and Timeliness Review--An Approach to Curbing Inappropriate Hospital Utilization." Topics in Health Care Finance 7 (Spring 1981): 51.

TABLE 4

Types of Information to be Recorded Under Course of Treatment*

Medical and surgical	Neuro/Psychiatric
<ol style="list-style-type: none"> 1. Lab tests, diagnostic X-ray, EKG, EEG <ol style="list-style-type: none"> a. Type and date ordered b. Date performed and impression if significant new finding c. Date physician notes results if significant d. Date transcribed 2. Consultations and referrals <ol style="list-style-type: none"> a. Date requested b. Date performed and significant findings 3. Dates on which diagnoses appear confirmed, or ruled out 4. Dates of important medication or therapy 5. Operative procedures <ol style="list-style-type: none"> a. Date of decision by physician b. Date of ward transfer c. Date of cancellations d. Date of surgery 6. Other physician or nursing notes or quotes that indicate significant symptomatic changes having a bearing on patient's course of treatment and recovery 7. Discharge planning <ol style="list-style-type: none"> a. Significant notes b. Date of social work referral c. Date of discharge order/ recommendation d. Date of discharge 	<ol style="list-style-type: none"> 1. Lab test, diagnostic X-ray, EKG, EEG <ol style="list-style-type: none"> a. Type and date ordered b. Date performed and impression if significant new finding c. Date physician notes results if significant d. Date transcribed 2. First medical evaluation 3. Brief summary of treatment plan 4. Significant signs of change in patient's symptoms (behavioral, physical, etc.) 5. Follow-up medical evaluation 6. Any change in treatment plan 7. Date final diagnosis made 8. Dates of subsequent formal medical evaluation (new ward, etc.) 9. Kind, course, and frequency of therapy (e.g., occupational therapy, group therapy, medication) 10. Discharge planning <ol style="list-style-type: none"> a. Significant notes b. Date of social work referral c. Date of discharge order/ recommendation d. Date of discharge

* Edwards, Arch B. "Care Levels and Timeliness Review--An Approach to Curbing Inappropriate Hospital Utilization." Topics in Health Care Finance 7 (Spring 1981): 53.

and x-rays. A study published in 1976 shows that in the twenty-year period from 1951 to 1971, the average number of diagnostic x-rays increased 186%, and the average number of laboratory tests increased 151% for inpatients. Between 1971 and 1975 the use of laboratory tests increased another 66% for inpatients and 122% for outpatients. Use of x-rays for inpatients increased 25.5% for the same period of time. Repeat tests account for a significant portion of the increase in utilization of laboratory tests. More recent estimates of laboratory tests in the United States indicate that approximately five billion tests were ordered in 1977. This amounts to about 20 lab tests for each person in the country. Another estimate revealed that approximately 150 million people received one or more x-rays in 1979. Cost is a critical concern. The approximate cost of the five billion laboratory procedures was \$11 billion, while the cost of x-rays in 1979 was approximately \$6 billion. Laboratory and x-ray costs are estimated to account for twenty-five percent of all health care costs.²⁸

Reasons for increased utilization include large numbers of routine screening examinations, third party reimbursement policies, repeat testing, lack of discriminating clinical judgment, increased utilization of tests in teaching hospitals, the practice of defensive medicine, increased insurance coverage, and other financial incentives; failure on the part of physicians to fully understand and use test results appropriately, undue physician dependence on test results instead of reliance on clinical observation; increases in modern technology; institutional requirements; and patient demand. Overutilization in teaching hospitals might be reduced, if medical students were taught to make discriminating diagnostic and management decisions and to order tests accordingly. The dread of malpractice suits and the belief that comprehensive testing is necessary account for much unnecessary utilization. The fact is that the absence of such testing has not been responsible for a significant number of malpractice judgments. Making physicians aware of this could reduce overutilization. Education of physicians and patients could also lead to solving excessive and unnecessary use of ancillary services.

Each should be made aware that failure to order tests may represent the most appropriate and cost efficient care.²⁹

The major long term goal of ancillary service review should be to achieve appropriate utilization of services expressed as the provision of high-quality, cost-effective patient care. More immediate goals of utilization review, quality assurance, or cost containment must be evaluated to support the overall goal. Utilization review can be directed toward controlling the expansion of the department's total services by reducing inappropriate low-yield and nonessential utilization. Quality assurance should be directed toward problems which could lead to adverse incidents and misadventures. The review can also be directed to reducing technical errors, improving timeliness of services, and reducing patient exposure to unnecessary toxic or high-risk tests, procedures, and treatments. Cost containment can be addressed toward the rate of services being ordered to manage service intensity and costs. The basic methodology of approach includes selection of a specific department to be reviewed; establishment of a committee to oversee development of a review system; identification of problem areas, establishment of objectives, and implementation of review methods; implementation of corrective action procedures; and measurement of impact.³⁰

Three types of audits were developed at a university medical center to assess diagnostic services utilization. The first, criteria-based diagnostic services review, requires the development of criteria for the use of a diagnostic service. Explicit criteria are developed by the expert opinion of committee members and consultants. A number of records are audited for conformance to the criteria. Records not meeting criteria are examined to determine whether they are reasonable exceptions. Remaining charts are considered to show inappropriate use of the diagnostic test. Education of physicians about the proper use of these services is accomplished when deemed necessary.

The second type of audit developed, descriptive diagnostic services review, assesses the way in which services are used in order to tabulate reasons for the service being

used. Patients' principle problems and those for which the test was obtained are recorded. The review specifically seeks clinical problems prospectively identified by the committee. If a reason is not evident, the chart is reviewed by a physician. Review results are tabulated, and depending on the committee's evaluation, a list of criteria is established and a criteria-based review is performed.

The last type of audit developed is the outcome-based diagnostic services review. This is a survey of the use of one test to determine how often it either provides new diagnostic information or changes patient management. The chart reviewers note the results of the diagnostic test and written comments by the physician about further diagnostic and therapeutic action taken as a result of the test. Characteristics of patients for whom the service is most useful are identified and physicians are informed to help make their use of the service more cost effective.³¹

The same facility studies the most frequently ordered tests at the hospital. Those tests audited are typically those frequently ordered three or more times in seven days for a single patient, are ordered for relatively few reasons, are not ordered as part of a panel that includes other tests, and are relatively costly. Criteria for review identify situations which should be present to justify multiple determinations of diagnostic procedures in a short period. Cases for review are identified by the laboratory's computerized reporting system. The audit procedure is depicted at Figure 5. If the record does not meet criteria, a physician reviews the chart, and if the test is disapproved, a disapproval package is placed in the medical record adjacent to the most recent progress note. The package includes a disapproval letter to the ordering physician, a list of the criteria, an appeal form, and educational material regarding the test.³²

Eisenberg believes this study has shown that ancillary-service-based review to be a more feasible method than diagnostic-based review in identifying potential ancillary services utilization problems. Prior to a diagnosis-based chart audit, it is difficult to

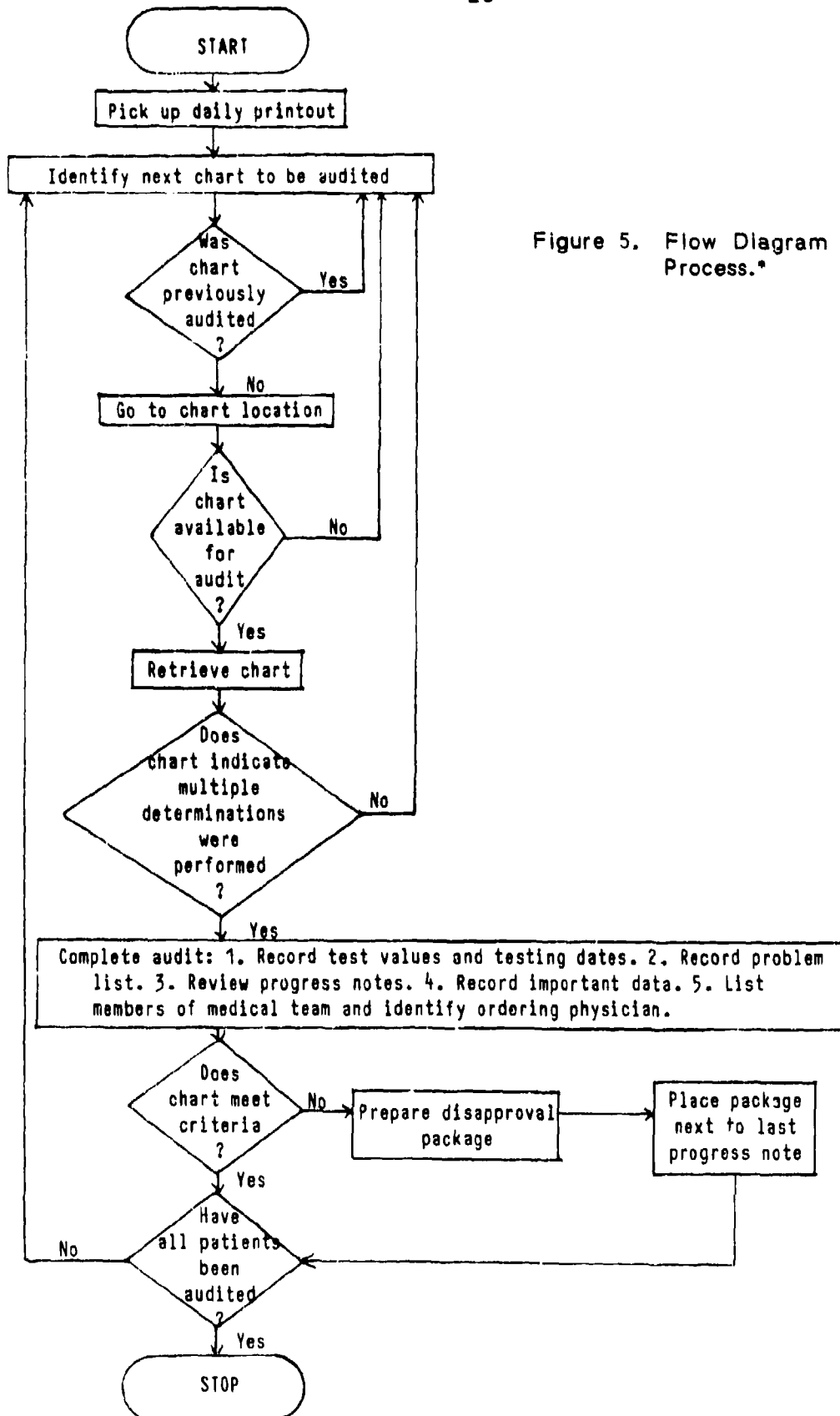


Figure 5. Flow Diagram of the Audit Process.*

* Faulkner, Pamela et al. "Many Diagnostic Tests May Be Unnecessary." Hospitals 55 (16 April 1981): 58.

determine that patients possessing a certain discharge diagnosis may be likely to have received unnecessary ancillary services. Additionally, many patients have multiple diagnoses, and the diagnosis-specific methodology might describe overutilization occurring in these complicated patients. It is also more feasible to determine the appropriate indications for the use of ancillary services than to describe which services may and may not be performed for a given diagnosis.³³

If the service-based strategy is to be used for ancillary services review, several major questions with underlying considerations must be addressed:

1. Is the review feasible? Are data available in readily accessible hospital logs and other data bases? Can agreement be reached among experts about the appropriate use of the service?

2. What is the potential impact of reviewing the service? Is it a high-unit-cost but low-volume service or a high-volume but low-unit-cost service? Is the service potentially harmful to the patient? What is the expected ability to change physicians' use of the service? What is the potential relationship of the review to other cost control efforts?

3. Is there suspicion of inappropriate use of the service? Is it being used unnecessarily? Is it an obsolete service? Is the service being underused in some instances?³⁴

Little doubt should exist by now about the importance of an attempt to rationalize the use of ancillary services. The services are expensive, whether due to the high-volume use of low-unit-cost services or to the use of expensive, highly technical services. There is reasonable evidence that there is substantial unnecessary use of many diagnostic tests. Variation in use among physicians and hospitals indicates a lack of widespread standards for their use. What remains is development of approaches to altering physician ordering behavior.³⁵

Surveillance of the utilization of laboratory tests has usually relied on retrospective

evaluations of the decisions made by health care providers, based on comparisons of documented data in patients' records with experience and expertise of medical reviewers. Explicit comparisons of use of laboratory procedures with standards, prescribed criteria, or algorithms have also been done. Cost evaluations have also been used in laboratory evaluations. One study involved peer review with implicit process judgment to assess utilization patterns on the medical service of a university hospital. The objectives of the study were to discover the character and extent of problems in laboratory utilization, to gather data and compare the magnitude of the ten most frequently ordered tests with that of other less commonly used procedures, to evaluate the process by which retrospective review judgments are made, and to compare the approach by a pathologist with that of a group of primary physicians. Twenty-five myocardial infarction charts were selected. The top ten tests were ranked in order of frequency. Each laboratory order and result was scored as grade 1, if it was necessary and appropriate for the suspected medical purpose for which it was intended; grade 2, if it was possibly a necessary test; and grade 3, if it was unnecessary and inappropriate. A total of 1,651 tests were ordered or reported, 938 of which were from the top ten test category (56.8%). The pathologist reviewed all twenty-five records. He scored one-third of all tests and forty-four percent of the ten most frequently ordered tests as unnecessary. Nine patient charts from the sample of twenty-five were scored by both the pathologist and a board of primary care physicians. The board considered 42.8 percent of the total procedures medically unnecessary, while the pathologist believed only 26.5 percent of the tests ordered in these selected charts to be unnecessary. The panel considered very few tests of intermediate necessity (grade 2), while the pathologist placed 17.7% of the tests in that category. The panel's and the pathologist's scores for the medically necessary category were very similar, scoring 54.6 and 55.8 respectively. This study supported the notion that physicians in like specialties tend to be less forgiving in peer review of each other than of physicians in specialties

other than their own. The author attributes this phenomenon to charitable behavior toward non-fellow members or a reflection of scientific discomfort with judging someone with significant knowledge and expertise in a division of patient care other than their own.³⁶

McManus discussed a study conducted on a concurrent basis in response to complaints about delays in posting laboratory data in patient records. A criterion was established requiring the posting of the results within twenty-four hours of the laboratory's receipt of a physician's request. Records were reviewed twice daily for ten consecutive days. The initial study demonstrated that thirty-three percent of the test results were delayed beyond the twenty-four-hour posting criterion. Subsequent assessments were made and adjustments implemented which brought the posting delay down to occur in only nine percent of the posting actions.³⁷

In another study, routine chest x-ray films were analyzed to determine the value of the examination in screening for new chest abnormalities on admission. The population tested were older veterans, a large number of whom suffered from acute exacerbations of chronic conditions often involving the heart or lungs. Abnormal chest findings occurred in 46% of the population surveyed. This survey reemphasized the fact that the usefulness of a screening test in detecting a disease depends on the prevalence of the disease in the screened population. Care must be taken in extending utilization review decisions from data based on one population to another dissimilar one.³⁸

Gerstein reported that a hospital performed a time study analysis to determine the time between a physician's order for an x-ray and its posting in the patient's record. The first study demonstrated a total average time of 62½ hours. Adjustments were made and a later study showed the average time of 51½ hours. Subsequent discussions with different department heads resulted in additional adjustments and a resolve to get the x-ray result posted within an overall turn-around goal of thirty-six hours.³⁹

Utilization Review in Graduate Medical Education Programs

Many view the problems of over- and underutilization of laboratory tests as being the result of a lack of education of physicians. While some educational shortfall is made up in practice, there is a predominant failure to instill a logical framework for test use, knowledge of test cost factors, and a comprehension of test limitations in medical students, which leads to the problems presently experienced in improper test use. Educational programs at all physician career levels should stress improvement in test selection and use. Benson firmly believes that medical student instruction in the use of laboratory resources must be more systematic, practical, and thorough. This instruction must also be more outcome and cost oriented than is presently the norm. Because several studies of overutilization in house staffs have shown marked initial improvement followed by a return to misuse of tests, there is also a need to insure that there is continuing reinforcement.⁴⁰

One study assessed physicians' knowledge of costs of thirty-one different diagnostic tests. First year, second year, and third year students, as well as non-clinical faculty, house staff, and clinical faculty physicians, were part of the study. The physician was considered to have good knowledge if he estimated the test's cost within twenty-five percent of the actual cost. The cost estimate was considered over- or underestimated if it was greater than twenty-five percent from the actual cost. Of the 1880 total responses, 34.6% were considered good knowledge estimates, 38.2% were low, and 27.2% were high, showing a tendency to underestimate costs. As students progressed through training, their knowledge of diagnostic test costs increased slightly, and there was a noticeable shift from overestimates to underestimates. A similar pattern was noted for non-clinical faculty, house staff, and clinical faculty. These findings indicate a need for physicians to be better informed of the costs of diagnostic tests.⁴¹

Strong Memorial Hospital, a teaching hospital located in Rochester, New York,

conducted a study into the patterns of laboratory use for hospitalized patients on the medical service in 1970. Many factors responsible for excessive use were listed (see Table 5), and strategies to promote optimal use were developed and implemented (see Table 6). Patterns of use were analyzed over the succeeding seven years since the original study. The analyses demonstrated reduced numbers of clinical chemistry tests and no growth in hematology, microbiology, and diagnostic radiology tests ordered. Internal medicine residents from the Strong program scored in the lowest (optimum) quartile for unnecessary or contraindicated laboratory tests and for costs of diagnostic tests and in the highest quartile for essential or indicated tests and for total Patient Management Problem score.⁴²

Another study pointed to the less obvious educational program costs to hospitalized patients. In a hospital which has both teaching and nonteaching floors, a comparison of costs of work-ups and treatments demonstrated that service charges on teaching floors are sixty percent higher than on nonteaching floors. The sicker the patients are, the greater is the disparity.⁴³

Medical schools are beginning to introduce courses into the undergraduate curriculum which teach efficient and effective utilization of the clinical laboratory. By the time the students are ready for their clinical clerkship, they will have an understanding of the function and effective utilization of the laboratory.⁴⁴

The important role of physicians in the generation of medical care costs is evident, but methods of inducing physicians to participate in cost containment efforts are not well developed. Efforts to change physicians' use of medical services have included education, peer review and feedback, administrative changes, participation, penalties, and rewards. Educational programs have had mixed success. Those using individualized instruction are most effective. Several feedback and peer-review programs, as well as administrative interventions, have demonstrated reductions in costs. While penalties and rewards may be effective, alterations in the current reimbursement system could

TABLE 5

Factors Contributing to Excessive Use
of Laboratory Tests in the Teaching Hospital*

1. INSTITUTIONAL

- a. High proportion of tertiary care patients
- b. Multiplicity of physicians involved in the care of individual patients
- c. Lack of individualization of preadmission or admission testing according to patient risk or prior information
- d. Application of test "routines" in high-intensity care areas (for example, intensive care unit)
- e. Peer pressure (teacher; student)
- f. Desire for new knowledge
- g. Isolation of clinical pathologist from clinician

2. PHYSICIAN

- a. Inadequate knowledge of test characteristics
- b. "Blanket" testing (for example, simultaneous ordering of secondary, diagnostic tests in addition to primary, screening tests)
- c. Erroneous inferences from test results leading to additional tests
- d. Diagnostic "overkill" (for example, use of two or more confirmatory tests when one will suffice)
- e. Inappropriate test (wrong test, or right test at wrong time)
- f. Medicolegal considerations

3. LABORATORY

- a. Logistical conveniences (for example, phlebotomy teams; comprehensive laboratory test requisition form)
- b. Laboratory inefficiencies (for example, long turn-around time)

4. PATIENT

- a. Need for reassurance
- b. Patient expectations

*Griner, Paul F. "Use of Laboratory Tests in a Teaching Hospital: Long-Term Trends." Annals of Internal Medicine 90 (February 1979): 248.

TABLE 6

Development of Educational Strategies to Promote
Optimal Use of Laboratory Services *

1. POLICY CHANGES

- a. Elimination of routine chest x-ray on admission unless requested by the admitting physician.
- b. Writing of orders for laboratory tests in the medical order book rather than directly onto a highly structured laboratory requisition.

2. PROGRAM CHANGES EXAMPLE--Creation of subspecialty elective time in the second year of residency with return to inpatient floor (with direct responsibility for interns and medical students). Ordering laboratory tests by third year residents closely approaches optimum patterns of laboratory use.

3. DIDACTIC APPROACHES--Weekly seminars on such subjects as:

- a. Specificity and sensitivity of laboratory tests.
- b. Application of probability theory in test result interpretation.
- c. Use of laboratory results among "healthy" patients.
- d. Cost containment programs.
- e. Hospital reimbursement mechanisms.

4. INFORMAL APPROACHES

- a. Placement of a manual of laboratory charges on each floor.
- b. Weekly distribution of the cumulative hospital bill of each patient to the attending resident.
- c. A review with interns of principles of "good" laboratory practices.
- d. Resident participation in research projects on laboratory use with feedback to house staff.
- e. Teaching attending critically reviewing use of laboratory tests by residents on rounds

* Griner, Paul F. "Use of Laboratory Tests in a Teaching Hospital: Long-Term Trends." Annals of Internal Medicine 90 (February 1979): 248.

offer financial incentives to physicians practicing in a cost effective manner. None of the six methods has been shown to reduce costs in all situations when used alone.⁴⁵

Studies that have suggested that physicians order more tests than can be defended on the basis of need or outcome led one teaching hospital to question its practices. The realization was not only for the cost containment issues of the immediate institution, but also that the patterns of patient care and resource use are established in learning and will be habits that will affect long-term practice patterns. Two interventions were studied among first year residents: concurrent chart review and peer review discussions to reinforce efficient strategies, and a financial incentive to reduce testing. Results were compared against first year resident test ordering practices of the previous year and a control group. Statistically significant (forty-seven percent) reduction and sustained effect was noted in the concurrent chart and peer review group.⁴⁶

In addition to educational benefits, peer review takes on even greater meaning when the realization that current legislation and congressional thought shows that Congress believes it to be the most effective way of controlling utilization of health resources.⁴⁷

Summary of Literature Review

In summary, a review of the literature demonstrates a number of factors which necessitate utilization review within health care facilities. Over time, a number of commonly accepted approaches to utilization review have been developed. Many of these approaches have been applied to laboratory utilization review problems in health care delivery. Utilization review activities have also been applied to the furtherance of graduate medical education in ancillary service resource management practices.

MEDCENs must not ignore these external trends and must be proactive by adopting new management tools to evaluate and manage the utilization of health resources.

Utilization review of ancillary services is a proven and effective management tool which should be adopted immediately by Army MEDCEN command groups and internal managers.

RESEARCH METHODOLOGY

The intent of this section is to provide the details of how the objectives of this study will be accomplished. Each objective of the study will be addressed in sequential order and intermediate tasks to achievement of the objective will be outlined. A schematic plan for the study's design and execution is depicted at Figure 6.

Study of the Current Literature

The first objective was to accomplish a review of the literature. A comprehensive review of the literature was performed in the foregoing Review of Literature section. Several methods and techniques have promising applicability to an Army MEDCEN's utilization review of ancillary services. The impetus for this review is present in the external environment, several methods have been applied to teaching hospital settings, and deficiencies have been found and corrected by administrative action or change initiatives within graduate medical programs. The literature reflects a need for Army MEDCENs to address ancillary utilization review in its day-to-day operations and graduate medical education programs.

Analysis of the Current Utilization Review Framework

The second objective is to define the current organizational framework existing within BAMC which addresses utilization review and provides opportunities for heuristically applying ancillary services review. This study will involve assessing the formal organization (hierarchical organization) and the matrix organization (task organization of the committee structure, special staff officers and functional advisors). Existing management tools, measures, and reports which can be of assistance will also be assessed.

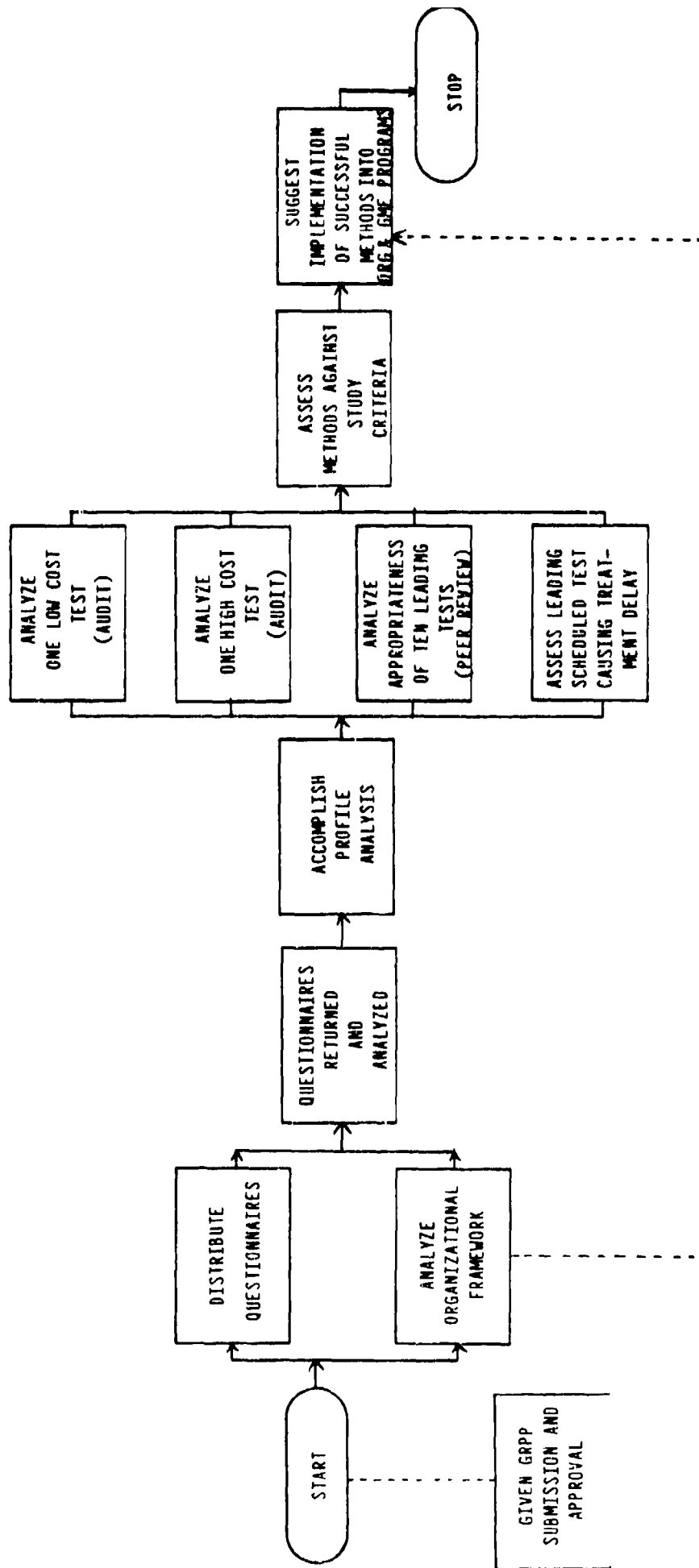


Figure 6. Study Design.

Assessment of Need Within BAMC

The third objective is to determine if there is a need for ancillary services utilization review within BAMC. A questionnaire has been designed to gather expert opinion regarding need for a program. The questionnaire and an accompanying letter are shown at Appendix A. The questionnaire will be forwarded to department and service chiefs having teaching responsibilities. The same questionnaire will be forwarded to the Chief, Department of Pathology, to obtain his opinion. A comparison of the responses will be accomplished. A second questionnaire will be forwarded to pathology staff and resident physicians. The questionnaire is designed to obtain their assessment of the most overutilized tests, the scheduled tests which cause treatment delays, and the ten most frequently ordered tests. A letter explaining the second questionnaire and the questionnaire are shown at Appendix B.

Questionnaire results will be analyzed, using the worksheets at Appendix C. A narrative description will be provided from the questionnaire's results.

Profile Analysis

Having obtained expert opinions from department and service personnel, and having compared these opinions to the responses of the Chief, Department of Pathology, a comparison will be made with actual laboratory workload data to determine if there is a correlation between this data and the expert opinion, using the Spearman Rank Correlation Coefficient. This analysis will be limited to the ten most frequently ordered tests. The Spearman Rank Correlation Coefficient is described in Appendix D.

The profile analysis will determine which low cost test, high cost test, leading scheduled test, and ten most frequently ordered tests will be analyzed in the next four steps. (See Figure 6.)

Review of Suspected Overutilized Tests

One low cost and one high cost test will be analyzed for appropriateness of services ordered. After the tests are identified, a group of physicians will be identified and surveyed to determine the criteria that must be present to order the test. The criteria they develop will be sampled on ten test orders to pre-test and refine the criteria. The medical record reviewer will refer all patient records not meeting the criteria to a physician for an appropriateness determination. If the criteria need to be adjusted, the adjustments will be made, and then fifty test orders will be reviewed. The results of the review will be recorded on the form shown in Appendix E.

Peer Review

Having identified the ten most frequently ordered tests by expert opinion and profile analysis, ten charts from recent dispositions of a service will be pulled. All charts will have the same diagnosis. The tests to be analyzed will be abstracted chronologically by date and time of receipt in the laboratory and the test result.

The Chief, Department of Pathology, and a panel of two or three physicians will be asked to judge each test's appropriateness by reliance on their experience. The following scoring will be used:

- A = necessary and appropriate test for the suspected medical purpose
for which it was used
- B = possibly necessary test
- C = unnecessary test⁴⁸

A record rating sheet in Appendix F will be used to score the results. The review results will be tabulated and compared.

Scheduled Test Review

The leading scheduled laboratory test which causes patient treatment delays as identified by the questionnaires will be assessed to determine if change of policy, procedure, scheduling, or other matters may be addressed and improved. A flow chart or PERT analysis will be accomplished to pinpoint delays. If feasible, a linear program model will be constructed to determine if the resources may be maximized.

Analysis of Methods Tested Against Study Criteria

Personnel time expenditures will be kept on each review activity to determine total time spent on each method. The processes and outcomes of each review will be measured against the criteria developed. Results of the reviews will be channeled to appropriate internal managers and committees for information or action.

Implementation

Review methods that were successful will be recommended for integration into the organizational framework and graduate medical education programs by capitalizing on the results of the literature review and expert opinion.

CHAPTER II

DISCUSSION

The literature review, accomplished in Chapter 1, clearly reflected a need for army MEDCENs to address ancillary services utilization review in daily operations, quality assurance activities, and graduate medical education programs. This chapter will summarize the implementation of the approved research methodology for this graduate research project.

Analysis of the Current Utilization Review

Framework Within BAMC

Hierarchically, BAMC is organized in a traditional AMEDD MEDCEN organizational framework. The Chief, Professional Services, who also serves as the Deputy Commander, is responsible for all clinical activities and graduate medical education programs. Department chiefs are responsible for well-defined areas of clinical activities and graduate medical education programs. Service chiefs insure day-to-day clinical activities are accomplished within medical specialty or subspecialty areas and provide graduate medical education to interns, residents, and fellows. Daily, weekly, and monthly meetings are held which provide either formal or informal forums for ancillary service utilization review problem identification.

Brooke Army Medical Center is an institution designated by the Army Medical Department to provide graduate medical education opportunities. In carrying out these responsibilities BAMC adheres to the General Requirements, Essentials of Accredited Residencies put forth by the Accreditation Council for Graduate Medical Education of the American Medical Association (ACGME). The ACGME requires that each program provide instruction in the socioeconomics of health care and in

the importance of cost containment.⁵⁰ It also requires resident physicians to participate in institutional committees and councils, especially those that relate to patient care review activities and to apply cost containment measures in the provision of patient care.⁵¹ BAMC demonstrates its commitment to graduate medical education through an Institutional Agreement which meets program responsibilities and sets forth resident physician responsibilities.⁵²

A questionnaire completed by fifty-six BAMC interns, residents, and fellows at the May 1983 Transition to Practice Seminar asked attendees to state their degree of agreement with the following statement: "There was instruction in the socio-economics of health care which included cost containment." A majority (62.5%) disagreed with the statement, 21.4% neither agreed nor disagreed, and 16.1% agreed somewhat. None of the attendees strongly agreed. Residents (34) disagreed most (64.7%) with the statement. Interns (12) disagreed the least (58%).⁵³ This points to a need to include such instruction within graduate medical education programs at BAMC.

The matrix organization of the Professional Services at Brooke Army Medical Center is, in large part, managed through committees. The major committee having responsibilities for quality assurance, patient care assessment, utilization review, and risk management is the Medical Care Evaluation Committee and its various subcommittees. This committee's membership includes the Chief, Professional Services, as chairman, the Executive Officer, all department chiefs, a representative from the Dental Activity, the Ambulatory Patient Care Coordinator as members, and the Chief, Patient Administration Division, as recorder. Seventeen separate subcommittees report to the Medical Care Evaluation Committee on a monthly or quarterly basis. The Medical Care Evaluation Committee reports to the MEDCEN Executive Committee.

A Laboratory Support Committee is also formalized within BAMC and meets on call of the chairman. It, likewise, is chaired by the Chief, Professional Services, and

has as members representatives from all departments, the Professional Services Administrator, the Chief, Department of Pathology and Area Lab Services, the Chief, Anatomical Pathology Service, the Chief, Clinical Pathology Service, the pathologist from the Institute of Surgical Research, and the lab manager, who performs as recorder. One of its functions is the review of laboratory utilization and ordering patterns.

The Executive Committee for Utilization Review consists of the commander, the Chief, Professional Services, the Executive Officer, the Chief, Department of Nursing, the Chief, Patient Administration Division, and the Comptroller. The committee meets monthly and has as part of its purpose the review of inpatient services, outpatient services, and supporting services for appropriateness.⁵⁴

A Special Subcommittee of the Hospital Education Committee performs periodic analysis of each specialty program to include appraisal of the effectiveness of utilization of resources. Resources specifically identified in the Institutional Agreement are the library, medical records system, and clinical support services, including those in the Departments of Pathology and Radiology, Social Work Service, and Nutrition Division. The Special Subcommittee is responsible to recommend methods and programs to assess the effectiveness in meeting program goals and how well the provided resources are being utilized.⁵⁵

Within the Patient Administration Division, there is medical record review and audit expertise within the Medical Records Administration Branch. The branch is staffed by Registered Records Administrators and Accredited Records Technicians who are well versed in review and audit techniques. This branch supports all patient care evaluation committees in medical audits. This resource, however, is already burdened with many reviews each month. Therefore, methods developed by this project must be done within existing personnel constraints with simplicity and logic. It is likely that this situation is true of most other MEDCENs.

Both a hierarchical and matrix organizational framework exist so that ancillary service utilization review activities may be accomplished with relative ease and without creating a new organizational framework so that it may be accomplished. There are many entry points for initiating ancillary services utilization review as shown in Figure 7. Other MEDCENs possess similar hierarchical and matrix organizations. One laboratory study or diagnosis could be reviewed periodically when there is suspected overutilization, underutilization or inappropriateness of use. This study could occur at any organizational level that detects a potential problem and the feedback on the study results could be disseminated through the organization via the framework depicted in Figure 7. If it is identified by committee action, the committee minutes could reflect the problem identification, assessment, steps in resolution, and follow-up as appropriate.

Assessment of Need Within BAMC

The questionnaire shown in Appendix A was forwarded to department and service chiefs having teaching responsibilities to determine if there was a need and a community of support for ancillary utilization review within an Army Medical Center. All department chiefs and 93 percent of the service chiefs returned the questionnaire. The analysis of the questionnaire by groups of department chiefs and service chiefs is at Appendix H.

The Chief, Department of Pathology, responded "no" when asked if utilization review of ancillary services was included in his personal educational program. He felt that it should be accomplished within an army MEDCEN as it would enable identification problems in ancillary services usage. His residency program includes utilization review by discussion of specificity and sensitivity of diagnostic tests, by profile analysis of selected tests ordered, and by use of laboratory results and application of probability theory in test result interpretation. His ranking of the criteria

by importance indicated that the system should be:

1. Simple, logical and inexpensive .
2. Dependent upon the presence of medical judgment in establishing criteria and reviewing exceptions.
3. Capable of enhancing resource management education within graduate medical education programs.
4. Accomplished within existing personnel resources.
5. Designed to meet army regulatory and JCAH standards.

As a composite group, the department and service chiefs strongly believe that there should be an ancillary services program in an Army Medical Center and highly favor (90%) including the program in graduate medical education programs they direct.

As a group, the department and service chiefs (19/21) either include in their current program or would include in a prospective program the following approaches to ancillary services utilization review:

1. Medical records audit with feedback to interns and residents (57.9%).
2. Elimination of routine testing on admission unless specifically requested (36.8%).
3. Discussion of specificity and sensitivity of diagnostic tests (94.7%).
4. Profile analysis of selected tests ordered by interns and residents on their service (31.6%).
5. Resident participation in research projects on laboratory use with feedback to house staff (5.3%).
6. Peer and staff review of appropriateness of tests ordered and used in clinical decision-making with subsequent discussion during didactic session (78.9%).
7. Pre-service review and approval by staff physicians (15.8%).

8. Use of laboratory results and application of probability theory in test result interpretation (36.8%).

9. Critical analysis of test ordering patterns on ward rounds by staff physicians (36.8%).

10. Discussion by guest physician lecturers on military versus civilian laboratory services workup costs (10.5%).

11. Discussion of cost effectiveness of "screening" preoperative laboratory tests as a part of preoperative evaluations (5.3%).

Collectively, the department and service chiefs would want the ancillary service utilization program to be designed to that it is:

1. Simple, logical, and inexpensive.
2. Dependent upon the presence of medical judgment in establishing criteria and reviewing exceptions.
3. Capable of enhancing resource management education within graduate medical education programs.
4. Accomplished within existing personnel resources.
5. Designed to meet army regulatory and JCAH standards.

Department and service chiefs agreed on the ranking of the first two and the fourth criteria. Department chiefs, however, believed more strongly that the program should be designed to meet army regulatory and JCAH standards by ranking that criterion third. The department chiefs ranked the criterion of capability of enhancing resource management education within graduate medical education programs fifth, which indicates the department chiefs favoring a more universal ancillary services utilization review program within an army MEDCEN.

It is also interesting that the composite group agrees exactly with the Chief, Department of Pathology's criteria ranking. This factor indicates the potential of meaningful communications and mutual support of a viable ancillary services utilization

program.

The favorable responses to the questionnaire indicate clearly that there is a need as well as a community of support among department and service chiefs having graduate medical education responsibilities for including ancillary services utilization review within an Army Medical Center.

Profile Analysis

The questionnaires also solicited responses from the department and service chiefs on the five low cost and five high cost tests the chiefs suspected of being overutilized, the scheduled laboratory tests that caused delays in patient treatment, and the ten most frequently ordered laboratory tests. (See Appendix A.) A similar questionnaire was forwarded to the pathology staff and resident physicians. (See Appendix B.) To assist in each group's completion of the questionnaire, a list of low cost, high cost, and scheduled tests was developed by gathering the expert opinion of clinical lab officers, biochemists, immunologists, chemists, and microbiologists. (See Appendix G.) The test was considered low cost if it cost less than \$.41 per test procedure. The figure \$.41 per test procedure was selected because it was the average cost per test procedure for the Department of Pathology for the first half of fiscal year 1983.

A comparative analysis of questionnaire responses is shown at Appendix G. Four different groups of opinions were compared, namely department chiefs, service chiefs, the Chief of Pathology, and a composite of the pathology staff and residents.

In analyzing the responses to the question of what five low cost laboratory tests were suspected of overutilization, three or more groups identified electrolyte tests, correct blood counts (CBC), SMAC profiles, and urinalysis tests. Since it is a composite of many low cost chemistry tests, the SMA-6 was selected for analysis in the medical record review of suspected review of overutilized tests which will be

discussed in the next section of this paper.

Three or more groups identified Prothrombin Time/Partial Prothrombin Time as a high cost test suspected of overutilization. This test was selected for medical record review and will be discussed in the next section.

Only the service chiefs and the pathology staff identified scheduled tests suspected of causing treatment delays. The only scheduled test identified by both groups was bone marrow studies. Subsequent discussion with the Chief, Clinical Pathology Service, revealed there was a greater need to study the glucose tolerance test. This test will be discussed under a subsequent section, entitled, "Scheduled Test Review."

The most difficult part of the profile analysis step of this study was the analysis of the ten most frequently ordered tests identified by department chiefs, the Chief of Pathology, the service chiefs, and the pathology staff and resident physicians. (See Appendix H.) Two large difficulties were encountered: one with analysis of the tests identified by the twenty-eight physicians and the second with analysis of the laboratory's historical volume.

The physicians rank-ordered the ten most frequently ordered tests from a list of over 360 lab tests routinely accomplished by the Department of Pathology. Department chiefs ranked a total of thirty laboratory tests among seven chiefs surveyed. Service chiefs ranked a total of fifty-four tests among fourteen chiefs surveyed. Pathology staff physicians ranked a total of twenty laboratory tests among three staff surveyed. Pathology residents ranked twenty-three lab tests among four residents surveyed. Responses were averaged, and the ten most frequently ordered tests were ranked within each group. The large number of tests identified within each group made this analysis very difficult.

In analyzing the laboratory's historical volume, a limitation of this study was operative, namely, some information which would enhance this study and resultant

utilization review activities may not be available in the form desired. College of American Pathology (CAP) data was available for only thirty months instead of the anticipated three years. The CAP data was listed by section fiscal year workload. With the duplicative labs necessitated by BAMC's dispersion between Main Hospital, Beach Hospital, and the Area Lab Service, data had to be consolidated. Additionally, the CAP total tests included control samples, reorders for tests with inaccurate outcome, and insufficient sample quantities. It is estimated that the CAP data overstates tests actually ordered by 10 percent. Finally, the CAP data was not ranked by volume; therefore it was necessary to study the top eighteen tests identified by the physician groups for the thirty-month period (see Item 14, Appendix H) and rank the eighteen tests by volume. Once this was accomplished, a Spearman Rank Correlation Coefficient was calculated as proposed in Appendix D.

A summary of the laboratory test monthly average historical volume and the calculations of the Spearman Rank Correlation Coefficient for each physician group is at Appendix I. No physician group's opinion of test volume correlated with the historical volume ranking. If the laboratory data were ranked by volume in CAP reports and available to perform the opinion survey with the Spearman Rank Correlation Coefficient, one could better assess physician knowledge of the most frequently ordered tests. This study was unable to conclude whether physician knowledge was either good or poor in terms of overall laboratory workload. The study was able to conclude that of the eighteen tests identified and ranked by physicians' opinion of the most frequently ordered tests, the physicians' opinions did not correlate with historical volume ranking of CAP workload data. The ten most frequently ordered tests identified in Appendix I will be further assessed in the peer review section later in the study.

Review of Suspected Overutilized Tests

The low cost test selected for the review of appropriateness of services ordered was the SMA-6 profile of glucose, blood urea nitrogen, sodium, potassium, chloride, and carbon dioxide. The high cost test selected was the Prothrombin Time/Activated Partial Prothrombin Time.

The criteria for ordering the tests and the appropriate responses by the physician noting abnormal results were developed through consultation with the Chief, Clinical Pathology Service, Department of Pathology. The criteria, responses, and medical audit results are shown at Appendix J. Sixty lab test results were obtained from laboratory files at Beach and Main Hospitals. The criteria were pre-tested as proposed. Refinement of the criteria was not found to be necessary after the first ten tests reviewed.

In review of the SMA-6, a total of thirty tests were reviewed. Records were not on file for thirteen of the patients tested (43%). This was due to ten of the patients having been tested in mid- to late April. The review took place in mid-May. Records were in final and committee review or awaiting documentation prior to file. Thirteen tests met criteria. The remaining four failed to meet criteria and were referred to the physician reviewer. Three were determined to be appropriate as pre-operative studies. One test failing to meet criteria was determined to be inappropriate due to an absence of logical need in the course of care. (See Appendix J.)

The review of the Prothrombin Time/Activated Partial Prothrombin Time was also accomplished on a sample of thirty lab test results. Records for five patients were not on file for reasons mentioned above. All of the remaining twenty-five lab tests were found to be appropriate by the criteria. No records were forwarded to the physician reviewer.

Subsequent discussion with the physician reviewer yielded the important point

that many tests such as these are rarely inappropriate. It is preferable to include frequency of test in the ordering criteria. In addition to this lesson learned, it is also appropriate, when accomplishing a retrospective review of laboratory tests, to sample tests accomplished sixty to ninety days prior to the record review.

Peer Review of Laboratory Test Utilization

The diagnosis of other noninfective gastroenteritis (5580) was selected for review of the appropriateness, overutilization, or underutilization of laboratory tests during inpatient care.

Ten records with this diagnosis were reviewed from the Pediatric Inpatient Service from dispositions between November 1982 and February 1983. The records were reviewed by the Chief of Pediatrics and the Chief of Clinical Pathology Service. The review of each record was summarized on the record rating sheet at Appendix F. The average length of stay was 1.9 days with one patient at six days and six patients at one day. All patients were less than two years of age. There were seven females and three males in the sample.

A total of eighty-five laboratory studies were ordered in the care of the patients (average 8.5, range 3-28, median and mode 5 and 7). Fifty-three (62%) of the laboratory studies were posted on the chart. Of the remaining thirty-two tests ordered, physicians noted results from the missing laboratory tests in seventeen instances (53%). Fifteen tests were ordered in Doctor's Orders (DA Form 4256), but results were not noted in any physician or nursing note.

The ten records were reviewed for the presence of the top ten most frequently ordered tests identified by questionnaire responses of physicians. Of the eighty-five tests ordered forty-six were from this group (54%). Thirty-one (67%) were posted on the chart, ten (22%) were not posted on the chart but were noted in some part of the record, and five (11%) were neither posted nor mentioned elsewhere in the records.

The pediatrics staff scored fifty-two of the eighty-five tests as necessary (61%), twenty-seven (31.8%) as possibly necessary, and six (7.1%) as unnecessary. Thirty-two (70%) of the top ten most frequently ordered tests were scored necessary, nine (20%) were scored as possibly necessary, and five (10%) were scored as unnecessary. Twenty (51.3%) of the "other" tests were scored as necessary, eighteen (46.2%) as possibly necessary, and one (2.5%) as unnecessary. The tests scored as unnecessary and possibly necessary were converted into College of American Pathology (CAP) weighted units. (See Appendix K.) Tests scored unnecessary consumed 41.1 CAP weighted units. Tests scored as possibly necessary consumed 3012.73 weighted units. Total Operations and Maintenance (OMA) expenditures for the Department of Pathology for the first six months of fiscal year 1983 (\$2,220,923) were divided by total CAP weighted value workload (8,416,516) to obtain a dollar value per CAP weighted unit (\$.264). Multiplying the dollar value per CAP weighted unit (\$.264) by the weighted value of tests scored unnecessary (41.1) yields an expenditure of \$10.85 for six tests which may have been unnecessary. Multiplying the dollar value per CAP weighted unit (\$.264) by the weighted value of tests scored possibly necessary (3012.73) yields an expenditure of \$795.36 for twenty-five tests scored possibly necessary.

More accurate dollar expenditures per CAP weighted unit could be determined by more in-depth analysis; however, this analysis demonstrates that there is merit to this method of analysis of ancillary services consumed for care of patients. Teaching chiefs could use this method of analysis to determine if fellows, residents, and interns are properly utilizing the ancillary services and if they are making progress in patient care management. Analyses similar to these could be used in teaching conferences, in Departmental Medical Care Evaluation Subcommittees, in the Medical Care Evaluation Committee, in the Hospital Education Special Subcommittee, and in the Executive Committee for Utilization Review.

The Chief of Pediatrics suggested that the scoring system used be revised from

"necessary," "possibly necessary," and "unnecessary" to be scored as "indicated," "possibly indicated," and "not indicated."

The Chief, Clinical Pathology Service, scored all tests as being necessary. His feeling was that he could not judge necessity; rather he could judge only whether the tests were ordered with appropriate or inappropriate frequency. He suggested the record rating sheet be revised to include frequency. He also suggested that if the test was scored as being at an inappropriate frequency that it also be described as being excessively ordered or inadequately ordered. A revised record rating sheet is at Appendix K.

The results of the review by the pathology staff and the Chief of Clinical Pathology Service was similar to a review documented by McConnell et al., in that the pediatrics physicians were less forgiving in peer review of each other than of physicians in specialties other than their own. McConnell attributed this to charitable behavior toward non-fellow members or a reflection of scientific discomfort with judging someone with significant knowledge and expertise in a division of patient care other than their own.⁵⁵ When queried about his scoring being significantly different than the pediatrics staff, the Chief of Clinical Pathology Service stated that it was due to his personal discomfort in judging others with significant knowledge and expertise beyond his own.

Scheduled Test Review

After review of the questionnaires and discussions with the Chief, Clinical Pathology Service, regarding scheduled tests identified by physician groups (see Appendix H), the glucose tolerance test was selected for analysis.

The glucose tolerance test is conducted in the Main Hospital laboratory on a scheduled basis. Three patients are usually scheduled at 0700 each Monday, Wednesday, and Friday. Before the test is scheduled, the patient must have had a fasting blood

sugar test result of less than 140 milligrams per deciliter (mg/dl) of glucose and a two-hour postparandial blood test result of greater than 140 mg/dl and less than 200 mg/dl of glucose. The patient must abstain from alcohol intake for seven days and must have consumed a minimum of 300 grams of carbohydrates each day for three days prior to the test to obtain the most reliable results. A flow chart depicting the patient's preparation and test scheduling is at Appendix L. Generally the test may be scheduled within three to seven working days. If there is a priority inpatient test required or if tests cannot be scheduled within ten calendar days, a fourth or fifth patient is added to each day's schedule. There is also the capability to expand the testing to five work days weekly or to expand the test to the Beach Pavillion laboratory. The test is conducted through the Main Laboratory Phlebotomy Room. Since this area is staffed by civilians, there is the advantage of continuity in the test process. Timing is essential to insure accurate test results as can be seen from the Program Evaluation Review Technique Analysis depicted in Appendix L. Given the activity time estimates provided by the main laboratory NCOIC, there is a 91.28% probability of completing the test and distributing results within eight hours. There is sufficient slack time available for three-hour glucose tolerance tests to be scheduled as late as nine each morning. A glucose tolerance test flow sheet is included at Appendix L for use in the Phlebotomy Room as desired by laboratory management to assess delays and gain a more accurate estimate of time if it is determined that the clinical staff is not satisfied with current scheduling policies. The current scheduling policies appear to be flexible enough to meet current demand.

Analysis of Methods Against Study Criteria

The review of two suspected overutilized tests consumed twenty man-hours in selecting a laboratory test to be reviewed, obtaining criteria, obtaining lab slips, pulling records, reviewing records, and discussing records not meet criteria with physicians.

Approximately one hour of physician time was consumed. The peer review of laboratory tests ordered consumed thirty man-hours in selecting a diagnosis to be reviewed, obtaining records, analyzing the records, transferring laboratory tests ordered and results to the record scoring sheet, transporting the records to the physicians for review, and analyzing the results. Approximately three hours of physician time was consumed. The scheduled test review consumed ten man-hours in discussion, analysis of work records, analysis of patient preparation and scheduling, performing a PERT analysis and developing a glucose tolerance test flow sheet. The analyst performing the medical audits was only partially trained. A trained medical records analyst could possibly perform the medical audits in far less time.

Reviewing the outcomes of these methods, it is apparent that there was simplicity and logic in each review. Only personnel expenses were of any consequence. The minimal time expenditure indicates that any of these three methods can be accomplished within existing personnel resources. Each was accomplished with the presence of medical judgment and consumed minimal physician time. The outcomes of each of the medical records reviews provides meaningful feedback which may be used in enhancing resources management education within the several graduate medical education programs within BAMC. Results of these reviews, if documented and presented within committee minutes, would meet army regulatory and JCAH standards. Documentation of these reviews would also provide evidence of BAMC's adherence to the requirements of the American Medical Association Accreditation Council for Graduate Medical Education.

Results of these reviews will be provided to the Chief, Clinical Pathology Service, for presentation at his departmental Medical Care Evaluation Committee meeting and Laboratory Support Committee meeting. The scheduled test analysis of the glucose tolerance test will also be provided to the Chief, Clinical Pathology Service, to internally manage patient scheduling and test accomplishment. The results of the peer review of

laboratory tests ordered will be provided to the Chief, Department of Pediatrics, for use in teaching conferences and in the departmental Medical Care Evaluation Committee.

CHAPTER III

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The literature review and expert opinion of department and service chiefs obtained by questionnaire results point to a need for including utilization review of ancillary services in graduate medical education programs within an Army Medical Center. To enhance utilization review activities within a Medical Center, the successful approaches shown by this study should be disseminated for general use and specific use in graduate medical education programs.

A study by Schroeder et al. on educational attempts to improve physician ordering of clinical services demonstrated that weekly lectures on cost containment and clinical decision-making, as well as weekly faculty audit and feedback on appropriateness of test ordering, could reduce physician ordering, but the educational costs exceeded immediate financial benefit.⁵⁶ This study does provide teaching chiefs an excuse not to provide this education, but it does not provide an excuse to exclude cost containment and resource utilization education as required by the Accreditation Council for Graduate Medical Education. A suggested Appendix to the BAMC Institutional Agreement, which provides guidance to teaching chiefs for implementation of utilization review of ancillary services activities within their respective programs is at Appendix M.

There is a viable hierarchical and matrix framework existing within BAMC to heuristically apply utilization review of ancillary services. The committee structure currently in place can support this review and disseminate results to appropriate committees and hierarchical levels. A suggested addition to Appendix B of the BAMC Memorandum on Quality Assurance is at Appendix N.

In absence of ranked historical volume of test procedures accomplished by ancillary

services, it is not recommended that further efforts be made to judge whether physician opinion of the most frequently ordered tests correlates with historical volume.

The review of suspected overutilized tests using the medical record audit form at Appendix E can be successfully utilized in analysis of specific tests ordered. At least one criterion should address the frequency that the test should be ordered.

The peer review of laboratory tests ordered methodology and form at Appendix F demonstrated that the form could be used simply and logically by a teaching chief, but test ordering frequency also had to be addressed to make it useful for the pathologist to review the tests ordered. This type of review would be especially useful to the chief in determining how the graduate physician student is utilizing ancillary service resources and subsequently if the graduate physician is making progress in how the patient and available ancillary service resources are managed.

The use of the flow chart and Program Evaluation Review Technique was successful in assessing the glucose tolerance test. These and other analytical tools can be successfully used in the analysis of scheduled tests provided by ancillary services.

Recommendations

1. Recommend that utilization review of ancillary services be included within graduate medical education programs at BAMC and evidence of this commitment be demonstrated by adopting the proposed Appendix to the Institutional Agreement shown at Appendix M of this study.

2. Recommend that utilization review of ancillary services be included within the existing hierarchical and matrix organization for utilization review within BAMC by adopting the proposed addition to Appendix B of the BAMC Memorandum 40-1, Quality Assurance, shown at Appendix N of this study.

3. Recommend that the Department of Pathology request a listing from the

College of American Pathologists on a semi-annual and annual basis which shows the leading laboratory tests accomplished ranked by volume of raw procedures. Availability of this information would allow trend analysis of tests ordered as well as an ability to identify tests which are suspected of over- and underutilization.

APPENDIX A

ANCILLARY SERVICES UTILIZATION REVIEW QUESTIONNAIRE
FOR DEPARTMENT AND SERVICE CHIEFS

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL

HSHE-ADR

SUBJECT

Ancillary Services Utilization Review Questionnaire

THRU: C, Prof Svcs

FROM Executive Officer

DATE

CMT 1

TO: SEE DISTRIBUTION

MAJ Leonard/am/3309

1. Major Thomas Leonard, a Health Care Administrative Resident, must complete a Graduate Research Project (GRP) in partial fulfillment of the requirements for a Master's Degree from the Army-Baylor Program in Health Care Administration. Major Leonard is accomplishing his GRP by designing an ancillary services utilization review program which is applicable to cost containment practices and enhances the quality of graduate medical education at Brooke Army Medical Center.

2. Part of his study design requires gathering expert opinion through survey of the chiefs of departments and services having teaching responsibilities. His questionnaire is attached at Incl 1.

3. For the purposes of Major Leonard's study and your completion of the attached questionnaire, the following definitions are operative:

a. ancillary services - limited to the diagnostic services of the Department of Pathology.

b. utilization review - is the ongoing evaluation of resources management. This review includes the appropriateness of admissions, services ordered and given, length of stay, discharge planning and practice and the use of outpatient services. The aim of this review is cost containment. It is designed to insure the appropriate allocation of resources in delivery of high quality care in the most cost effective manner. It will address overutilization, underutilization and inefficient scheduling of resources.

4. Request you complete the attached questionnaire and forward it to Major Leonard in the envelope provided NLT

1 Incl
as

MARION P. JOHNSON
COL, MSC
Executive Officer

DISTRIBUTION:

C, DEAM
C, Dept of Medicine
C, Dept of OB/GYN
C, Dept of Pathology
C, Dept of Pediatrics
C, Dept of Radiology
C, Dept of Surgery
C, General Medicine Svc
C, Cardiology Svc
C, Dermatology Svc
C, Gastroenterology Svc
C, Hematology/Oncology Svc

C, Infectious Disease Svc
C, Nephrology Svc
C, Pulmonary Disease Svc
C, Anesthesiology Svc
C, Cardiothoracic Svc
C, General Surgery Svc
C, Ophthalmology Svc
C, Orthopaedic Svc
C, Otolaryngology Svc
C, Urology Svc

ANCILLARY SERVICES UTILIZATION REVIEW QUESTIONNAIRE
FOR DEPARTMENT AND SERVICE CHIEFS

Department/Service _____

1. What is your age? _____
2. Years of active duty (nearest even number) _____
3. When you were pursuing your personal medical education, was utilization review of ancillary services included in your educational program?

4. Was your medical specialty education program military (M) or civilian (C)? Enter M or C, or both. _____
5. Should utilization review of ancillary services be accomplished with an Army MEDCEN? _____ Please explain your answer.

6. Is utilization review of ancillary services included in the educational program you now direct? _____

7. If your response to question 6 was yes, in what ways is it included in your educational program?

- _____ a. Medical record audit with feedback to interns and residents.
- _____ b. Elimination of routine testing on admission unless specifically requested.
- _____ c. Discussion of specificity and sensitivity of diagnostic tests.

- _____ d. Profile analysis of selected tests ordered by interns and residents on your service.
- _____ e. Resident participation in research projects on laboratory use with feedback to house staff.
- _____ f. Peer and staff review of appropriateness of tests ordered and use in clinical decision - making with subsequent discussion during didactic sessions.
- _____ g. Pre-service review and approval by staff physicians.
- _____ h. Use of laboratory results and application of probability theory in test result interpretation.
- _____ i. Critical analysis of test ordering patterns on ward rounds by staff physicians.
- _____ j. OTHER _____

8. If your response to question 6 was no, should utilization review be included in your program? _____

If your answer is yes, what ways should it be included in your program?

- _____ a. Medical record audit with feedback to interns and residents.
- _____ b. Elimination of routine testing on admission unless specifically requested.
- _____ c. Discussion of specificity and sensitivity of diagnostic tests.
- _____ d. Profile analysis of selected tests ordered by interns and residents on your service.
- _____ e. Resident participation in research projects on laboratory use with feedback to house staff.
- _____ f. Peer and staff review of appropriateness of tests ordered and subsequent use in clinical decision - making during didactic sessions.

- _____ g. Pre-service review and approval by staff physicians.
- _____ h. Use of laboratory results and application of probability theory in test result interpretation.
- _____ i. Critical analysis of test ordering patterns on ward rounds by staff physicians.
- _____ j. OTHER _____

9. If your answer to question 8 was no, please explain why you believe utilization review of ancillary services is not a necessary part of your teaching program.

10. In accomplishing a heuristic design of a system for utilization review of ancillary services, a set of criteria to evaluate alternatives is necessary. Listed below are five proposed criteria. Please rank the criteria and any other criteria you feel are necessary for a viable ancillary services utilization review system to complement your teaching program. A rank of 1 indicates the most important criteria, 2 next most important, etc. An optimal utilization review system should be:

- _____ Accomplished within existing personnel resources
- _____ Capable of enhancing resource management education within graduate medical education programs
- _____ Dependent upon the presence of medical judgement in establishing criteria and reviewing exceptions
- _____ Designed to meet Army Regulatory and JCAH standards
- _____ Simple, logical and inexpensive
- _____ _____
- _____ _____
- _____ _____

11. What five low unit cost laboratory tests do you suspect are overutilized?

- _____
- _____

12. What five high unit cost laboratory tests do you suspect are overutilized?

_____	_____	_____
_____	_____	_____

13. What laboratory tests requiring scheduling cause delays in patient treatment in your department or service?

_____	_____
_____	_____
_____	_____

14. What are the ten most frequently ordered laboratory tests in your department or service? Rank each test starting with most frequent (1) descending to the least frequent (10).

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

15. Provide any additional comments you consider pertinent to the design of a system for ancillary services utilization review. Thank you for your time in completing this questionnaire. Please return it in the envelope provided.

APPENDIX B

ANCILLARY SERVICES UTILIZATION REVIEW QUESTIONNAIRE
FOR PATHOLOGY STAFF AND RESIDENT PHYSICIANS

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL

HSHE-ADR

SUBJECT

Ancillary Services Utilization Review

THRU: C, Prof Svcs

FROM Executive Officer

DATE

CMT 1

C, Dept of Path & ALS

MAJ Leonard/am/3309

TO: SEE DISTRIBUTION

1. Major Thomas Leonard, a Health Care Administrative Resident, must complete a Graduate Research Project (GRP) in partial fulfillment of the requirements for a Master's Degree from the Army-Baylor Program in Health Care Administration. Major Leonard is accomplishing his GRP by designing an ancillary services utilization review program which is applicable to cost containment practices and enhances the quality of graduate medical education at Brooke Army Medical Center.
2. Part of his study design requires gathering expert opinion through survey of the chiefs of departments and services having teaching responsibilities. A second questionnaire has been designed for your completion to compare your opinion with department and service chiefs. This questionnaire is attached at Incl 1.
3. For the purposes of Major Leonard's study and your completion of the attached questionnaire, the following definitions are operative:
 - a. ancillary services - limited to the diagnostic services of the Department of Pathology.
 - b. utilization review - is the ongoing evaluation of resources management. This review includes the appropriateness of admissions, services ordered and given, length of stay, discharge planning and practice and the use of outpatient services. The aim of this review is cost containment. It is designed to insure the appropriate allocation of resources in delivery of high quality care in the most cost effective manner. It will address over-utilization, underutilization and inefficient scheduling of resources.
4. Request you complete the attached questionnaire and forward it to Major Leonard in the envelope provided NLT

2 Incl
as

MARION P. JOHNSON
COL, MSC
Executive Officer

DISTRIBUTION:

Staff Physicians, Department of Pathology - 1 ea
Residents, Department of Pathology - 1 ea

QUESTIONNAIRE FOR PATHOLOGY STAFF
AND RESIDENT PHYSICIANS

1. What five low unit cost laboratory tests do you suspect are overutilized?

_____	_____
_____	_____

2. What five high unit cost laboratory tests do you suspect are overutilized?

_____	_____
_____	_____

3. What laboratory tests requiring scheduling cause delays in patient treatment?

_____	_____	_____
_____	_____	_____
_____	_____	_____

4. What are the ten most frequently ordered laboratory tests? Rank each test starting with the most frequent (1) descending to the least frequent (10).

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

APPENDIX C
WORKSHEET FOR ANALYSIS OF QUESTIONNAIRE RESPONSES

ANALYSIS OF DEPARTMENT AND SERVICE CHIEFS'
RESPONSE TO QUESTIONNAIRE

	<u>DEPT CHIEFS</u>	<u>SVC CHIEFS</u>
A. Questionnaires forwarded	6	15
B. Number returned	_____	_____
C. Return rate	_____ %	_____ %
1. Average age	_____	_____
2. Average length of active duty	_____	_____
3. Was utilization review of ancillary services included in personal education program?		
Yes	_____ %	_____ %
No	_____ %	_____ %
4. Medical specialty education program		
Military?	_____ %	_____ %
Civilian?	_____ %	_____ %
5. Should utilization review of ancillary services be accomplished within an Army Medical Center?		
Yes	_____ %	_____ %
No	_____ %	_____ %
6. Is utilization review of ancillary services included in the educational program you now direct?		
Yes	_____ %	_____ %
No	_____ %	_____ %

	<u>DEPT CHIEFS</u>	<u>SVC CHIEFS</u>
7. In what ways is it included in your program?		
a. Medical record audit with feedback to interns and residents	_____	_____
b. Elimination of routine testing on admission unless specifically requested	_____	_____
c. Discussion of specificity and sensitivity of diagnostic tests	_____	_____
d. Profile analysis of selected tests ordered by interns and residents on your service	_____	_____
e. Resident participation in research projects on laboratory use with feedback to house staff	_____	_____
f. Peer and Staff review of appropriateness of tests ordered and use in clinical decision-making with subsequent discussion during didactic sessions	_____	_____
g. Pre-service review and approval by staff physicians	_____	_____
h. Use of laboratory results and application of probability theory in test result interpretation	_____	_____
i. Critical analysis of test ordering patterns on ward rounds by staff physicians	_____	_____
j. OTHER		
8. Should utilization review be included in your program?		
Yes	_____ %	_____ %
No	_____ %	_____ %
In what ways should it be included?		
a. Medical record audit with feedback to interns and residents	_____	_____
b. Elimination of routine testing on admission unless specifically requested	_____	_____
c. Discussion of specificity and sensitivity of diagnostic tests	_____	_____

	<u>DEPT CHIEFS</u>	<u>SVC CHIEFS</u>
d. Profile analysis of selected tests ordered by interns and residents on your service	_____	_____
e. Resident participation in research projects on laboratory use with feedback to house staff	_____	_____
f. Peer and staff review of appropriateness of tests ordered and use in clinical decision-making with subsequent discussion during didactic sessions	_____	_____
g. Pre-service review and approval by staff physicians	_____	_____
h. Use of laboratory results and application of probability theory in test result interpretation	_____	_____
i. Critical analysis of test ordering patterns on ward rounds by staff physicians	_____	_____
j. OTHER		
9. Chiefs indicating utilization review of ancillary services should not be included in program	_____	_____
10. Criteria ranking		
a. Accomplished within existing personnel resources	_____	_____
b. Capable of enhancing resource management education within graduate medical education programs	_____	_____
c. Dependent upon the presence of medical judgment in establishing criteria and reviewing exceptions	_____	_____
d. Designed to meet army regulatory and JCAH standards	_____	_____
e. Simple, logical, and inexpensive	_____	_____

PATH COMP

CHIEF, PATH

SVC CHIEFS

DEPT CHIEFS

11. Five low cost lab tests

12. Five high cost lab tests

13. Tests requiring scheduling
causing delays

ANALYSIS OF PATHOLOGY STAFF AND
RESIDENT PHYSICIANS' RESPONSES TO QUESTIONNAIRE

	<u>PATHOLOGY STAFF</u>	<u>PATHOLOGY RESIDENTS</u>	<u>PATHOLOGY COMPOSITE</u>
1. Five low cost lab tests	<hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/>
2. Five high cost lab tests	<hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/>
3. Scheduled tests causing treatment delay	<hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/>
4. Ten most frequently ordered tests	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

APPENDIX D

SPEARMAN RANK CORRELATION COEFFICIENT ANALYSIS

THE SPEARMAN RANK CORRELATION COEFFICIENT⁴⁹

The Spearman Rank Correlation Coefficient will be used to determine whether the opinions of physicians surveyed follow historical data. This statistical test will be used to compare the ten most frequently ordered tests ranked by physicians against historical volume of the top ten leading tests over the past three years.

The following hypotheses will be tested:

H_0 : Physicians' opinion ranking of the ten most frequently ordered tests does not follow historical volume data.

H_A : Physicians' opinion ranking of the ten most frequently ordered tests does follow historical volume data.

The following steps will be accomplished:

1. The historical volume data will be ranked from 1 to 10. The physicians' opinion ranking of the ten most frequently ordered tests will be averaged and ranked from 1 to 10.

2. The physicians's ranking will be subtracted from the historical ranking.

The difference will be assigned the value of d_i .

3. Each d_i will be squared. A sum of the squared values will be computed,

4. Where:

n = number of tests ranked

$\sum d_i^2$ = Sum of the squared differences between physician opinion and historical volume ranking

r_s = Spearman Rank Correlation Coefficient

Compute

$$r_s = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$$

5. H_0 is rejected at the sigma (σ) significance level if r_s is greater or less than the critical value (r_s^*), stated as:

Reject H_0 if: $r_s^* < r_s < -r_s^*$.

6. The test will be applied to:

- a. Service chiefs only
- b. Department chiefs only
- c. Pathology staff
- d. All physicians in sample

APPENDIX E

MEDICAL RECORD AUDIT FORM

ANCILLARY SERVICES UTILIZATION REVIEW
MEDICAL RECORD AUDIT

TEST _____

Criteria/Indications/Situations for ordering test:

- 1.
- 2.
- 3.
- 4.
- 5.

Appropriate response by physician noting abnormal results:

- 1.
- 2.

#Tests reviewed _____

#Meeting criteria _____

#Referred to physician _____

Initials/Last 4 of Pat	Appropriate	Not Appropriate	Comment
------------------------	-------------	-----------------	---------

- 1.
- 2.
- 3.
- 4.
- 5.

Pattern Identified

Corrective Action

Medical Record Reviewer Signature _____

Physician Reviewer Signature _____

C, _____, Signature _____

Date _____

APPENDIX F
PEER REVIEW WORKSHEET

Service _____

Scoring:

A = Necessary

B = Possibly Necessary

C = Unnecessary

Discharge Diagnosis

TESTS

[illegible]

APPENDIX G

LIST OF HIGH COST, LOW COST, AND SCHEDULED
LABORATORY TESTS PERFORMED AT BAMC

LOW COST TESTS

Bacteriology

Culture

Nose and nasopharyngeal
Sputum
Throat

Smears

Gram stain
AFB stain
India Ink

Mycoplasma culture

Blood Bank

Type and antibody screen

Compatibility Tests

Coombs' Test (Direct)

Coord blood studies

Prenatal workup

Preop open heart surgery workup

Chemistry

Acetone

Albumin

Alcohol (Ethanol), Legal

Alkaline Phosphatase

Bilirubin, Total/Direct

Blood Gases

BUN

Calcium, Serum

Calcium, Urine

Calculi, Qualitative Analysis

Carotene

Chloride, Serum

Chloride, Urine

Cholesterol

CO₂

Copper, Serum

Copper, Urine

CPK Isoenzymes

Creatinine, Serum

Cystine, Qualitative

Cystine, Quantitative

Gamma glutamyltranspetidase

Glucose, blood

Glucose, urine, Quantitative

HDL-Cholesterol

Heavy metal screen (AS, BI, Hg, Sb)

Hemoglobin

5-HIAA(5-Hydroxyindoleacetic acid)

Lactose Tolerance

LDH Isoenzymes

Lead, blood

Lead, urine

Chemistry (Cont'd)

Lipoprotein Profile	Potassium, urine
L/S ratio	Protein, Quantitative, urine
Lithium	Protein, Total, serum
Magnesium serum	Protein, CSF
Magnesium urine	SGPT
Melanin	Sodium, serum
Osmolality, serum	Sodium, urine
Osmolality, urine	TSH (thyroid stimulating hormone)
Oxalate	Urea Nitrogen (UUN), urine
Phosphorus, serum	Urine Drug Screen
Phosphorus, urine	Zinc, urine
Potassium, serum	Zinc, serum

Hematology

CBC	Autohemolysis
Morphology & WBC differential	Sugar water test
Reticulocyte	Ham's test
Platelet estimate	Heinz body formation
Urinalysis	Heinz body prep
Eosinophil count	LE Prep
Erythrocyte sedimentation rate	Leukocyte alkaline phosphatase
Cerebrospinal fluid cell count and differential	Urine or sputum hemosiderin
Cytospin for pathologic exam	RBC fluorescence
Joint Fluid exam	Myoglobin

Chemistry (Cont'd)

Mesothelial cavity fluid	Viscosity
Cryoglobulin	Apt Test
Hgb F, Beeke-Kleinhauer	Factor XII-by urea solubility
Hgb F quantitation, alkali denaturation	Clot retraction
Unstable Ggb studies	Cryofibrinogen
Methemoglobin	

Parasitology

Blood, Occult and Gross	pH
Trichomonas vaginalis	Reducing Substances
Fecal fat (qualitative)	Trypsin
Knott's Concentration for Microfilariae	Worm Identification
Malaria	Anti-hyaluroinidase (AHT)
Leishmania Trypanosoma	Cold agglutinins
Microfilariae	C-Reactive protein
Muscle Fibers	Rheumatoid Factor
Ova & Parasites	RPR
Giardia	
Strongyloides	VDRL
Entamoeba histolytica	
Pinworm	
Paragonimus westermani	
Schistosoma hematobium	

Toxicology

Alcohol, Ethyl, Methyl and Isopropyl	Lithium
Amphetamines	Opiates
Carboxyhemoglobin	Methodone
Glutethimide	Methaqualone
	Phencyclidine HCL (PCP)

HIGH COST TESTS

Bacteriology

Antibiotic Susceptibility
 Standard Disc
 Minimal Inhibitory Concentrate (MIC)
 Serum Levels Schlichter Test
 Actual Serum Level

Smears AFB (Cont'd)
 Tissue Biopsy
 Bronchial washings
 Sputum
 Urine

Culture

Blood
 Bronchial washings
 Body Fluid
 Cerebrospinal fluid
 Stool or rectal
 Tissue
 Transtrachael
 Urine
 Wounds
 Vaginal & Cervical

Susceptibility Tests

Mycology (Yeasts and Fungi)
 Skin, nail scrapings
 Bronchial washings
 Sputum
 Urine

Fungal Serology, Serum

Fungal Serology, CSC

Smears AFB

Gastric fluid
 Pericardial
 Pleural

Legionaire's Disease Bascillus

CIF (Counterimmunoelectrophoresis)

Serogrouping/Typing

Blood Bank

Routine Blood
 Special Products
 Antibody Identification
 Autologous Donors
 Workup for suspected autoimmune
 hemolytic anemia
 Therapeutic phlebotomy

Hepatitis screening by ELISA Technique
 Leukopheresis
 Plateletpheresis
 Plasmopheresis
 Neocryptopheresis
 Plasma exchange

Chemistry

Acetaminophen	Iron, serum; Iron Binding Capacity
Acid Phosphatase, Prostatic Fraction	Total
Alcohol, medical	17-Keto-steroids
Aldosterone	Lactic Acid
Amikacin	LDH (Lactic dehydrogenase)
Ammonia	LH (Lutenizing Hormone)
Amylase, blood	Lipase
Amylase, urine	Metanephrine
Barbituates	Methadone
Catecholamines	Phenobarbital
CEA (Carcino-Embryonic Antigen)	Porphobilinogen
Cholinesterase, Pseudo	Prolactin
Coproporphyrine, urine	Quinidine
Cortisol	Renin (Angio-tension I)
CPK (Creatine Phosphokinase Total)	Salicylates
Cystine, Qualitative	SGOT
Digoxin	SMAC
Dilantin	T3 (tri-iodothyronine) Resin
DHEA-3	uptake
Estradiol (unconjugated)	T4 (Tetraiodothyronine)
Ferritin	Testosterone
Folate	Theophylline
FSH (Follicle-stimulating hormone)	Tobramycin
Gastrin	Tryglycerides
Gentamicin	Uric Acid, serum
Glucose Tolerance Test	Uric acid, urine
HbS AG	Uroporphyrine, urine
HCG	Vitamin B12
Hydrocortico-steroids (17-OH)	VMA (Vanillyl Mandelic Acid)
Ig E (PRIST)	Xylose serum
Ig E (RAST)	Xylose, urine
Insulin	

Hematology

Prothombin time	Immunoglobulin levels by nephelometry
Activated partial thromboplastin	(Cont'd)
time (APTT)	Alpha-antitrypsin
Sickle Hgb test	Haptoglobin
	Ceruloplasmin
	IgD
Immunoglobulin levels by nephelometry	Protein electrophoresis, serum
IgC	
IgA	Immunoelectrophoresis, serum
IgM	

Hematology

CSF electrophoresis	Osmotic fragility
T-B-M cell typing of lymphoid cells	Thrombin time
Complement studies	Serial thrombin time
Complement Total Hemolytic complement	Reptilase time
C-3	Mielke template bleeding time
C-4	Fibrinogen
C, esterase inhibitor titer	Factor assays
Properdin Factor B	Factor VII Antigen
Bone marrow prep	Fibrin split products
Hgb electrophoresis, cellulose acetate	Platelet aggregation
Hgb electrophoresis, citrate (acid) agar and starch gel	Mixing studies for factor inhibitors and inactivators
Hgb A ₂ by cellulose acetate electro- phoresis	Okasnobigeb + okasna AT III
Hgb H prep	Von Willebrand's factor assay
G-6-PD electrophoresis	Fletcher factor screen
G-6-PD screen	Platelet adhesivity
Osmotic fragility	

Parasitology

Intestinal parasites	Toxoplasma
Parasitic Serology Serum	
Amebiasis	

Serology

Anti-DNA	Anti-nuclear Antibody (ANA)
Anti-DNase B (ADB)	Anti-streptolysin O (ASO)

Serology (Cont'd)

Epstein-Barr virus (EBV)
 FTA-absorbed
 Heterophile Antibodies
 Microsomal Antibodies
 Mitochondrial Antibodies

Pariental Cell Antibodies
 Rubella Antibody
 Smooth Muscle Antibody
 Thyroglobulin Antibody
 Legionella Antibody

Toxicology

Barbituates (Class)
 Acetaminophen
 Amikacin
 Carbamazepine
 Digoxin
 Primidone
 Procainamide + N-acetyl
 Procainamide
 Propoxyphene

Diazepam
 Dephenylhydantoin
 Ethosuximide
 Gentamicin
 Phenobarbital
 Quinidine
 Salicylates
 Theophylline (aminophylline)
 Valproic Acid

Virology

Viral Isolation
 Throat swab
 Nasal washing
 Sputum
 Throat washings
 Urine
 Stool
 Spinal fluids
 Body fluids
 Scrapings
 Body tissues or organs
 Vaginal or cervical
 Varicella-zoster
 Rotavirus
 Whole Blood

Chlamydia Isolation
 Conjunction
 Respiratory Tract
 Rectal swabs
 Viginal or cervical
 Male urethra
 Complement Fixation
 Respiratory Battery I
 Respiratory Battery II
 Rickettsial Battery

Virology (Cont'd)

Arbovirus Battery

Coxsackie Battery

Rubeola, Mumps

Cytomegalovirus (CMV), Herpes
Simplex virus, Varicella-zoster
Chlamydia group

Coronavirus, Lymphocytic

Direct Fluorescent Antibody Test

SCHEDULED TESTSHematology

Bone Marrow Studies

Special Coagulation Studies

Osmotic Fragility

Cryoglobulin

Autohemolysis

LE Prep

Parasitology

Trichomonas Vaginalis

Leishmania Trypanosoma

Microfilæriæ

Giardia Strongyloides

Worm Identification

CHEMISTRY

Glucose Tolerance Test

Blood Bank

Leukophoresis

Plasma Exchange

Washed Red Blood Cells

Bacteriology

Legionnaire's Disease Bacillus

Microplasma Culture

Bordetella

Minimal Inhibitory
Concentration

Serum Levels Schlichter Test

Actual Serum Level

APPENDIX H
ANALYSIS OF QUESTIONNAIRE RESPONSES

ANALYSIS OF DEPARTMENT AND SERVICE CHIEFS'
RESPONSE TO QUESTIONNAIRE

	<u>DEPT CHIEFS</u>	<u>SVC CHIEFS</u>
A. Questionnaires forwarded	6	15
B. Number returned	<u>6</u>	<u>14</u>
C. Return rate	<u>100%</u>	<u>93.3 %</u>
1. Average age	<u>43</u>	<u>37</u>
2. Average length of active duty	<u>17.8</u>	<u>14.8</u>
3. Was utilization review of ancillary services included in personal education program?		
Yes	<u> </u> %	<u>7.1 %</u>
No	<u>100 %</u>	<u>92.9 %</u>
4. Medical specialty education program		
Military?	<u>67 %</u>	<u>50 %</u>
Civilian?	<u> </u> %	<u>21.4 %</u>
Mil. & Civ.?	33 %	28.6 %
5. Should utilization review of ancillary services be accomplished within an Army Medical Center?		
Yes	<u>100 %</u>	<u>78.6 %</u>
No	<u> </u> %	<u> </u> %
Guarded Yes		21.4 %
6. Is utilization review of ancillary services included in the educational program you now direct?		
Yes	<u>50 %</u>	<u>64.3 %</u>
No	<u>50 %</u>	<u>35.7 %</u>

	<u>DEPT CHIEFS</u>	<u>SVC CHIEFS</u>
7. In what ways is it included in your program?		
a. Medical record audit with feedback to interns and residents	<u>1</u>	<u>6</u>
b. Elimination of routine testing on admission unless specifically requested	<u>2</u>	<u>4</u>
c. Discussion of specificity and sensitivity of diagnostic tests	<u>3</u>	<u>9</u>
d. Profile analysis of selected tests ordered by interns and residents on your service	<u>1</u>	<u> </u>
e. Resident participation in research projects on laboratory use with feedback to house staff	<u> </u>	<u> </u>
f. Peer and staff review of appropriateness of tests ordered and use in clinical decision-making with subsequent discussion during didactic sessions	<u>2</u>	<u>8</u>
g. Pre-service review and approval by staff physicians	<u>1</u>	<u>1</u>
h. Use of laboratory results and application of probability theory in test result interpretation	<u> </u>	<u>2</u>
i. Critical analysis of test ordering patterns on ward rounds by staff physicians	<u> </u>	<u>3</u>
j. OTHER -- Department of Emergency and Ambulatory Medicine and Otolaryngology Service have prior military--now civilians lecture about workup costs, etc., in military vs. civilian life.		

8. Should utilization review be included in your program?

Depts-- 3 NO respondents to Question 6 only

Svcs--5 NO respondents to Question 6 only

Yes 67 % 80 %

No 33 % 20 %

In what ways should it be included?

a. Medical record audit with feedback to interns and residents	<u>2</u>	<u>2</u>
b. Elimination of routine testing on admission unless specifically requested	<u> </u>	<u>1</u>
c. Discussion of specificity and sensitivity of diagnostic tests	<u>2</u>	<u>3</u>

	<u>DEPT CHIEFS</u>	<u>SVC CHIEFS</u>
d. Profile analysis of selected tests ordered by interns and residents on your service	<u>2</u>	<u>2</u>
e. Resident participation in research projects on laboratory use with feedback to house staff	<u> </u>	<u>1</u>
f. Peer and staff review of appropriateness of tests ordered and use in clinical decision-making with subsequent discussion during didactic sessions	<u>2</u>	<u>3</u>
g. Pre-service review and approval by staff physicians	<u>1</u>	<u> </u>
h. Use of laboratory results and application of probability theory in test result interpretation	<u>2</u>	<u>2</u>
i. Critical analysis of test ordering patterns on ward rounds by staff physicians	<u>1</u>	<u>3</u>
j. OTHER		
9. Chiefs indicating utilization review of ancillary services should not be included in program	<u>1</u>	<u>1</u>
10. Criteria ranking Only 4 (67%) of department chiefs ranked the criteria Only 10 (83%) of service chiefs ranked the criteria		
a. Accomplished within existing personnel resources	<u>4</u>	<u>4</u>
b. Capable of enhancing resource management education within graduate medical education programs	<u>5</u>	<u>3</u>
c. Dependent upon the presence of medical judgment in establishing criteria and reviewing exceptions	<u>2</u>	<u>2</u>
d. Designed to meet Army regulatory and JCAH standards	<u>3</u>	<u>5</u>
e. Simple, logical, and inexpensive	<u>1</u>	<u>1</u>
f. Necessary for optimal patient management mentioned by one chief. This is considered to be included in c. above.		

	DEPT CHIEFS	SVC CHIEFS	CHIEF, PATH	PATH COMP
11. Five low cost lab tests	Electrolytes (Na, K, Cl, CO ₂)	CBC	C3C	CBC
	Serum glucose	Electrolytes	Electrolytes	Carboxyhemoglobin
	SMAC Profiles	ESR	SMAC Profiles	Electrolytes
	Throat Cultures	SMAC Profiles	Throat Cultures	SMA-6
	Urinalysis	Urinalysis	Urinalysis	Sputum culture
12. Five high cost lab tests	Cultures (in general)	Cultures(in general)	Drug screen	Digoxin levels
	Prothrombin Time	Partial Prothrombin Time	Protein Electrophoresis	Gentamicin levels
	Type & Cross Match	Prothrombin Time	Pt/Ptt	Protein Electrophoresis
		T3/T4 Uptake	Serology	T3/T4 Uptake
		Type & Cross Match	Serum Iron	Theophyllin levels
13. Tests requiring scheduling causing delays	No tests identified	Serum levels Schlichter Test	No Tests	Glucose Tolerance Test
		Bone Marrow Studies	Identified	Washed Red Blood Cells
		Serum antibiotic levels		Worm Identification
		Legionnaire's Bacillus		Bone Marrow Studies
		Special COAG		Le Prep

14. Ten most frequently
ordered tests

DEPT CHIEFS	SVC CHIEFS	CHIEF, PATH	PATH COMP
1 CBC	CBC	Urinalysis	SMA-6
2 Urinalysis	Urinalysis	CBC	Urinalysis
3 Electrolytes	SMA-20	SMA-6	CBC
4 Throat Culture	SMA-6	SMA-20	PT/PTT
5 Type, Screen, Cross-match	PT/PTT	Throat Culture	SMA-20
6 Urine Cultures	ESR	Type, Screen, Cross-Match	Serum Creatinine
7 Glucose	ANA	RPR	Throat Culture
8 BUN	Platelet Count	Urine Cultures	Urine Cultures
9 SMA-20	Creatinine	ANA	Digoxin levels
10 SMA-6	Type, Screen, Cross-Match	Blood Cultures	ESR

ANALYSIS OF PATHOLOGY STAFF AND
RESIDENT PHYSICIANS' RESPONSES TO QUESTIONNAIRE

	<u>PATHOLOGY STAFF</u>	<u>PATHOLOGY RESIDENTS</u>	<u>PATHOLOGY COMPOSITE</u>
1. Five low cost lab tests	<u>Of three staff surveyed</u> <u>there was no agree-</u> <u>ment on any one</u> <u>test being overutilized</u> _____	<u>CBC</u> <u>Electrolytes</u> <u>SMA-6</u> <u>Sputum Culture</u> <u>No agreement on fifth</u> _____	<u>CBC</u> <u>Carboxyhemoglobin</u> <u>Electrolytes</u> <u>SMA-6</u> <u>Sputum Culture</u> _____
2. Five high cost lab tests	<u>Protein Electrophoresis</u> <u>Theophylline Levels</u> <u>T3/T4 Uptake</u> _____ _____	<u>Digoxin Levels</u> <u>Gentamicin Levels</u> <u>Quinidine Levels</u> <u>T3/T4 Uptake</u> <u>Theophylline Levels</u> _____	<u>Digoxin Levels</u> <u>Gentamicin Levels</u> <u>Protein Electrophoresis</u> <u>T3/T4 Uptake</u> <u>Theophylline Levels</u> _____
3. Scheduled tests causing treatment delay	<u>Worm Identification</u> <u>Washed Red Blood</u> <u>Cells</u> _____ _____ _____	<u>Glucose Tolerance Test</u> <u>Bone Marrow Studies</u> <u>Le Prep</u> <u>Worm Identification</u> <u>Cryoglobulin</u> _____	<u>Glucose Tolerance Test</u> <u>Washed Red Blood Cells</u> <u>Worm Identification</u> <u>Bone Marrow Studies</u> <u>Le Prep</u> _____
4. Ten most frequently ordered tests	<u>SMA-6</u> <u>Urinalysis</u> <u>CBC</u> <u>SMA-20</u> <u>Serum Creatinine</u> <u>Urine Culture</u> <u>Serum Calcium</u> <u>ESR</u> <u>VDRL</u> _____	<u>SMA-6</u> <u>Urinalysis</u> <u>CBC</u> <u>Serum creatinine</u> <u>Throat Culture</u> <u>Serum CPK</u> <u>Digoxin Levels</u> <u>Gram Stain</u> <u>Acetaminophen Levels</u> _____	<u>SMA-6</u> <u>Urinalysis</u> <u>CBC</u> <u>PT/PTT</u> <u>Serum Creatinine</u> <u>Throat Culture</u> <u>Urine Culture</u> <u>Dogoxin Levels</u> <u>ESR</u> _____

APPENDIX I

TEN MOST FREQUENTLY ORDERED LABORATORY TESTS
AND THE SPEARMAN RANK CORRELATION
COEFFICIENT CALCULATION

COMPOSITE PHYSICIAN SAMPLE SELECTION OF
TEN MOST FREQUENTLY ORDERED LABORATORY TESTS
OCTOBER 1980 - 1 APRIL 1983
BROOKE ARMY MEDICAL CENTER

<u>Rank</u>	<u>Test</u>	<u>Monthly Average</u>
1	Glucose	16682
2	SMA-6	15028
3	BUN	14475
4	Electrolytes	13585
5	Creatinine	13170
6	CBC	7829
7	UA	6360
8	SMA-20	5979
9	PT/PTT	3706
10	RPR	2794

n = number of tests ranked = 10

x = historical ranking

y = physician group ranking

$x - y = d_i$ = difference in rankings

d_i^2 = square of differences

r_s = Spearman Rank Correlation Coefficient

r_s^* = Spearman Rank Correlation Coefficient critical value = .5515

α = Significance level = .90

H_0 : Physicians' opinion ranking of the ten most frequently ordered tests does not follow historical volume data.

H_A : Physicians' opinion ranking of the ten most frequently ordered tests does follow historical volume data.

Reject H_0 if: $r_s^* < r_s < -r_s^*$

$$r_s = 1 - \frac{6 \sum d_i^2}{n(n^2-1)}$$

1. Service Chiefs

<u>Test</u>	<u>x</u>	<u>y</u>	<u>x-y=di</u>	<u>di²</u>
Glucose	1		1	1
SMA-6	2	4	-2	4
BUN	3		3	9
Electrolytes	4		4	16
Creatinine	5	9	-4	16
CBC	6	1	-5	25
UA	7	2	-5	25
SMA-20	8	3	-5	25
PT/PTT	9	5	-4	16
RPR	10		10	100
				$\Sigma di^2 = 237$

$$r_s = 1 - \frac{6 (237)}{10[(10)^2-1]}$$

$$r_s = 1 - 1.436 = -.436$$

$$.5515 < -.436 < -.5515$$

ACCEPT H_0 Service chiefs' opinion ranking of the ten most frequently ordered tests does not follow historical volume data.

2. Department Chiefs

<u>Test</u>	<u>x</u>	<u>y</u>	<u>x-y=d_i</u>	<u>d_i²</u>
Glucose	1	7	-6	36
SMA-6	2	10	-8	64
BUN	3	8	-5	25
Electrolytes	4	3	1	1
Creatinine	5		5	25
CBC	6	1	5	25
UA	7	2	5	25
SMA-20	8	9	-1	1
PT/PTT	9		9	81
RPR	10		10	100
				$\Sigma d_i^2 = 383$

$$r_s = 1 - \frac{6(383)}{10[(10^2)-1]}$$

$$.5515 < -1.32 < -.5515$$

ACCEPT H₀: Department chiefs' opinion ranking of the ten most frequently ordered tests does not follow historical volume data.

3. Pathology Staff

<u>Test</u>	<u>x</u>	<u>y</u>	<u>x-y=d_i</u>	<u>d_i²</u>
Glucose	1		1	1
SMA-6	2	1	1	1
BUN	3		3	9
Electrolytes	4		4	16
Creatinine	5	6	-1	1
CBC	6	3	3	9
UA	7	2	5	25
SMA-20	8	4	4	16
PT/PTT	9	5	4	16
RPR	10	10	0	0

$$\Sigma d_i^2 = 94$$

$$r_s = 1 - \frac{6(94)}{10[(10)^2 - 1]}$$

$$r_s = 1 - .57 = .43$$

$$.5515 > .43 > -.5515$$

ACCEPT H₀: Pathology staff physicians' opinion ranking of the ten most frequently ordered tests does not follow historical volume data.

4. All Physicians in Sample

<u>Test</u>	<u>x</u>	<u>y</u>	<u>di</u>	<u>di²</u>
Glucose	1		1	1
SMA-6	2	3	-1	1
BUN	3		3	9
Electrolytes	4		4	16
Creatinine	5	8	-3	9
CBC	6	1	5	25
UA	7	2	5	25
SMA-20	8	4	4	16
PT/PTT	9	5	4	16
RPR	10		10	100

$$\Sigma di^2 = 218$$

$$r_s = 1 - \frac{6(218)}{10(100-1)}$$

$$r_s = 1 - 1.321 = -.321$$

$$.5515 > -.321 > -.5515$$

ACCEPT H₀: Physicians' opinion ranking of the ten most frequently ordered tests does not follow historical volume data.

APPENDIX J
RESULTS OF MEDICAL RECORD AUDIT
OF SUSPECTED OVERUTILIZED TESTS

ANCILLARY SERVICES UTILIZATION REVIEW
MEDICAL RECORD AUDIT

TEST Prothrombin Time (PT and Activated Partial Prothrombin Time (APPT)

Criteria/Indications/Situations for ordering test:

1. Anticoagulant Therapy (Coumadin/Heparin/Streptokinase)
2. Once per day unless therapy changes
3. Change in therapy
4. Appropriate screening test (Pre-Op, Liver Disease, etc.) to evaluate coagulation factors from screening standpoint
- 5.

Appropriate response by physician noting abnormal results:

1. Increase/Decrease dosage of anticoagulant
2. Give appropriate blood products (VIII - Cryoprecipitate; II - Fibrinogen Cryoprecipitate; VIII - Concentrate; IX - Concentrate; Other Factors - Fresh Frozen plasma try 2 and monitor results)

#Tests reviewed 30

#Meeting criteria 25 5 (17%) not on file

#Referred to physician 0

Initials/Last 4 of Pat	Appropriate	Not Appropriate	Comment
------------------------	-------------	-----------------	---------

1.

2.

3.

4.

5.

Pattern Identified None, all tests met criteria and responses were appropriate

Corrective Action None

Medical Record Reviewer

Signature _____

Physician Reviewer

Signature _____

C, Dept of Pathology _____,

Signature _____

Date _____

ANCILLARY SERVICES UTILIZATION REVIEW
MEDICAL RECORD AUDIT

TEST SMA-6

Criteria/Indications/Situations for ordering test:

Determining patients electrolyte status due to disease process

Test	Normal Values	
	SMAC	ACA/ASTRA-8
Sodium (Na)	136-145mEq/lmEq/l	
Potassium (K)	3.5-5.0mEq/l	
Chloride (Cl)	96-107mEq/l	98-108m Eq/l
Carbon Dioxide (CO 2)	24-30mEq/l	24-32mEq/l
Glucose	70-125mg/dl	40 yrs 70-110mg/dl
	85-125mg/dl	50 yrs
Blood Urea Nitrogen (BUN)	10-21mg/dl	7-22mg/dl

Appropriate response by physician noting abnormal results:

1. If low level then increase intake to correct to as normal as possible.
2. If high level then restrict intake to correct to as normal as possible.

#Tests reviewed 30 Reviewed by Record, 13 (43%) not on file

#Meeting criteria 13

#Referred to physician 4 3 appropriate, 1 not appropriate

Initials/Last 4 of Pat	Appropriate	Not Appropriate	Comment
1. NJC/8349	x		Pre-Op Breast Biopsy
2. TC/6886	x		Pre-Op Breast Biopsy
3. VMB/3834	x		Pre-Op Breast Biopsy
4. PRC/4284		x	S/P appendectomy, returned from Conv. Lv. with rec 1 bleeding. No logical indication of need for this study.
5.			

Pattern Identified 10 of 14 records not on file were from patients with LAB studies in mid to late

Corrective Action April. Only 1 test (7%) was inappropriate. Lab slip and medical record audit should be on lab tests accomplished at least 60 days prior to audit.

Medical Record Reviewer Signature _____

Physician Reviewer Signature _____

C, _____, Signature _____

Date _____

APPENDIX K
PEER REVIEW MEDICAL AUDIT

COLLEGE OF AMERICAN PATHOLOGISTS (CAP)
WEIGHTED VALUES FOR SELECTED LABORATORY PROCEDURES

<u>Laboratory Procedure</u>	<u>CAP Weight</u>
CBC	3
SMA-6	2.7
SMA-6 w/CR	2.8
Electrolytes	2.5
UA Routine w/Micro	6
Urine Culture (& Sensitivity)	
Neg	12.8
Pos	20.8
Stool Culture, Bacterial	
Neg	27.8
Pos	35.8
Stool Culture, Viral	
Neg	472
Pos	505
Blood Culture	
Neg	17.4
Pos	38.4
CBC w/Differential	7
Stool, Fecal Leukocytes	33
Stool, pH and Reducing Substance	7
Throat Culture	15.3
Wright's Stain of Stool	9
Stool, Ova & Parasites	80.8
UA Electrolytes	4.5
SMA-20	2.5
12 Hr Urine for Protein & Creatinine	10.5
Hgb Electrophoresis	82
Stool, Occult Blood	4
Nose Culture	15.3

Service _____

Initials/Last Four _____
Age _____
Sex _____

Admission Diagnosis _____

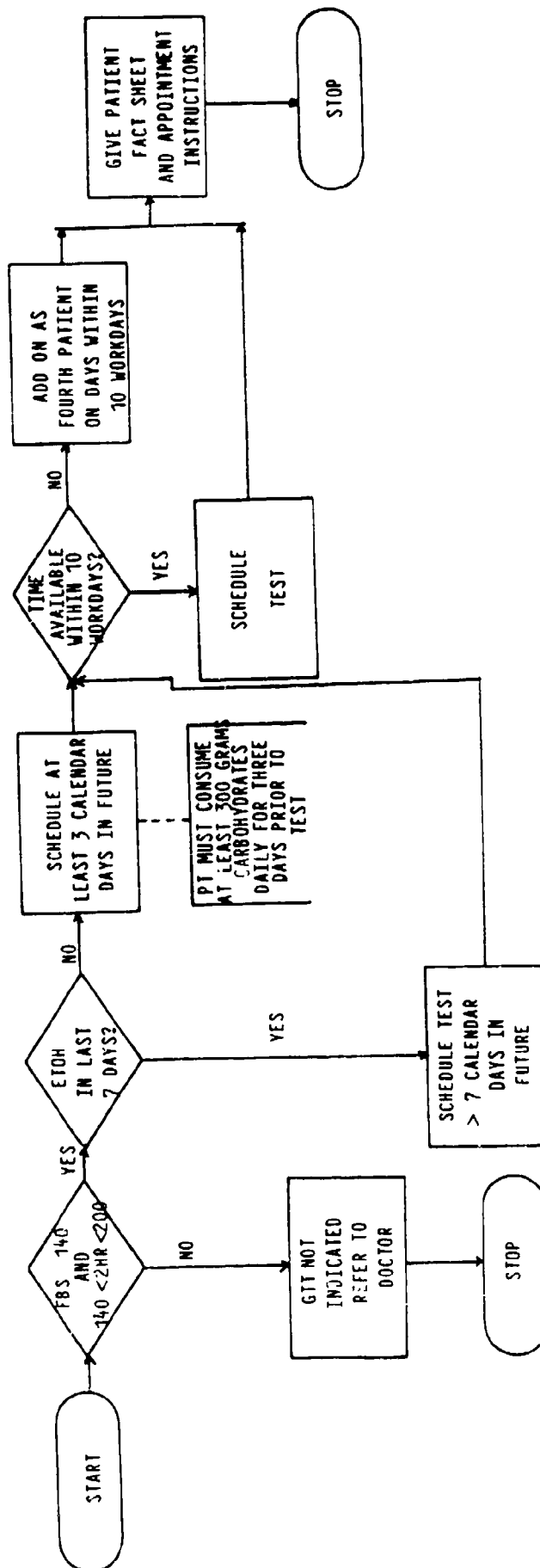
Discharge Diagnosis

A = Indicated
B = Possibly Indicated
C = Not Indicated
FA = Frequency Appropriate
FI = Inappropriate
E = Excess
I = Inadequate

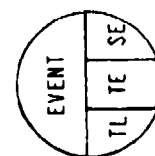
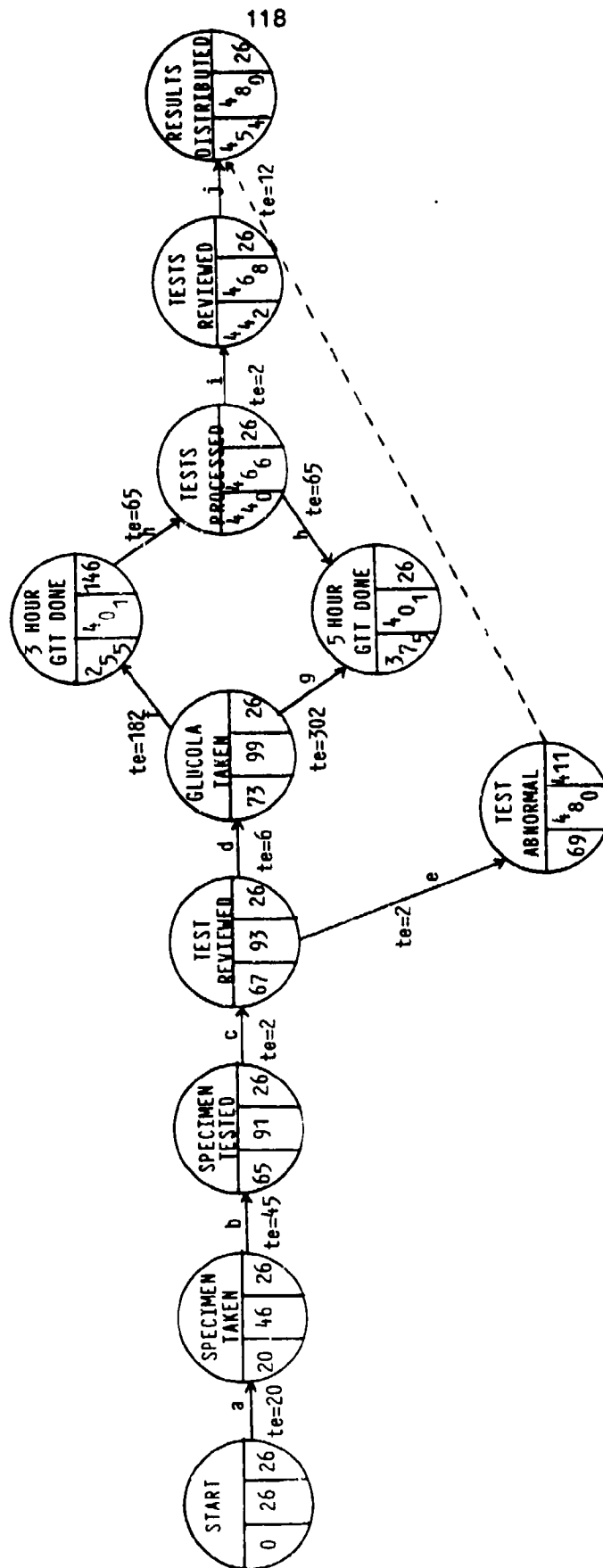
[illegible]

APPENDIX L
REVIEW OF SCHEDULED TEST

GLUCOSE TOLERANCE TEST PATIENT PREPARATION AND SCHEDULING



PROGRAM EVALUATION REVIEW TECHNIQUE GLUCOSE TOLERANCE TEST



GLUCOSE TOLERANCE TEST
ACTIVITY TIME ESTIMATES

ACTIVITY	to	tm	tp	te
a. Draw fasting blood sugar	1	15	60	20
b. Transport and process specimen	21	47	63	45
c. Review test results	1	2	5	2
d. Give patient glucola	2	5	15	6
e. Test abnormal, patient is released to physician care				
f. 3 hour GTT started	181	182	185	182
g. 5 hour GTT started	301	302	305	302
h. Transport and process specimens	46	62	93	65
i. Supervisory review	1	2	5	2
j. Break down results and distribute	2	10	30	12

$P(\text{Complete} \leq 480 \text{ minutes})$

$T = 480 \text{ minutes}$

$\mu_T = \sum te = 454 \text{ minutes}$

$\sigma_T = \frac{\sqrt{\sum \sigma e^2}}{C_p} = \frac{\sqrt{230.28}}{C_p} = 15.175 \text{ minutes}$

$Z = \frac{T - \mu_T}{\sigma_T} = \frac{480 - 454}{15.175} = 1.71$

$P(\text{Complete} \leq 480 \text{ minutes}) = 91.28\%$

<u>Cp</u> <u>Acty</u>	<u>tp - to + 6 = σe</u>	<u>σe^2</u>
a	60 - 1 + 6 = 9.83	96.69
b	60 - 20 + 6 = 6.67	44.44
c	5 - 1 + 6 = .67	.44
d	15 - 2 + 6 = 2.17	4.69
g	305 - 301 + 6 = .67	.44
h	93 - 46 + 6 = 7.83	61.36
i	5 - 1 + 6 = .67	.41
j	30 - 2 + 6 = 4.67	21.78
		<u>230.28</u>

GLUCOSE TOLERANCE TEST
FLOW SHEET

Patient Name _____

Date _____

Action		Earliest Expected Time	Latest Allowable Time*	Actual Time
a. Draw fasting blood sugar		0720	0800	
b. Transport and process specimen		0745	0903	
c. Review by supervisor		0747	0908	
d. Give patient glucola		0753	0923	
e. Test abnormal, release patient to physician		0755	0928	
f. Draw $\frac{1}{2}$ hour specimen		0827	0953	
g. Draw 1 hour specimen		0929	1058	
h. Draw 2 hour specimen		1031	1203	
i. Draw 3 hour specimen		1133	1308	
j. Draw 4 hour specimen		1235	1413	
k. Draw 5 hour specimen		1337	1518	
l. Transport and process specimen	(3)	1238	1433	
	(5)	1442	1638	
m. Review by supervisor	(3)	1240	1443	
	(5)	1444	1643	
n. Place results in distribution	(3)	1252	1513	
	(5)	1456	1713	

*Includes one hour delay for patients starting at 0800.

(3) - 3 hour GTT

(5) - 5 hour GTT

APPENDIX M

PROPOSED APPENDIX TO THE BAMC INSTITUTIONAL AGREEMENT
TO ADHERE TO THE STANDARDS OF THE
AMERICAN MEDICAL ASSOCIATION ACCREDITATION
COUNCIL FOR GRADUATE MEDICAL EDUCATION

PROPOSED APPENDIX
INSTITUTIONAL SUPPORT AGREEMENT
UTILIZATION REVIEW OF ANCILLARY SERVICES

1. PURPOSE. This appendix provides guidance to the several graduate medical education specialty programs for including instruction in utilization review of ancillary services.

2. RESPONSIBILITIES

a. Special Subcommittee of the Hospital Education Committee performs periodic analysis of each graduate medical education program to insure the effectiveness of utilization of resources. Resources include, but are not limited to the ancillary support services of the Departments of Pathology, Radiology, Social Work Service, and Nutrition Care Division.

b. Program Directors

(1) Must provide instruction in the socioeconomics of health care and importance of cost containment as required by the Essentials of Accredited Programs of the Accreditation Council for Graduate Medical Education and the Brooke Army Medical Center Institutional Agreement.

(2) May use the provisions of this appendix in carrying out their graduate medical education program responsibilities.

c. Graduate Physicians (Interns, Residents, and Fellows)

(1) Must participate in institutional committees and councils, especially those that relate to patient care review activities.

(2) Must apply cost containment measures in the provision of patient care.

3. METHODS OF ANCILLARY SERVICE UTILIZATION EDUCATION

a. Medical record audit with feedback to interns and residents.

b. Elimination of routine testing on admission unless specifically requested.

- c. Discussion of specificity and sensitivity of diagnostic tests.
 - d. Profile analysis of selected tests ordered by interns, residents, and fellows on service.
 - e. Graduate physician participation in research projects on laboratory use with feedback to staff.
 - f. Peer and staff review of appropriateness of tests ordered and used in clinical decision-making with subsequent discussion during didactic sessions.
 - g. Pre-service review and approval by staff physicians.
 - h. Use of laboratory results and application of probability theory in test result interpretation.
 - i. Critical analysis of test ordering patterns on ward rounds by staff physicians.
 - j. Use of guest lecturers from civilian sector in discussing ancillary service costs in the civilian sector versus the military sector of health care.
 - k. Discussion of usefulness and cost effectiveness of pre-operative ancillary service tests.
 - l. Others as determined appropriate by the program director.
4. FORMS FOR REVIEW OF ANCILLARY SERVICE TESTS
- a. Review of Single Test. A useful form for review of a single ancillary services test is included at Attachment 1. It is suggested that the criteria for each test include at least one criterion on test frequency.
 - b. Peer Review of a Medical Record. A useful form for reviewing tests ordered within the context of care for a diagnosis is included at Attachment 2. A form for evaluating test frequency is at Attachment 3. The former is suggested for use within a teaching program. The latter is recommended if the review is to also be accomplished by ancillary service chiefs. This form would be of particular usefulness to program directors for measuring

graduate physician progress and for use in teaching conferences.

5. USE OF INFORMATION DEVELOPED BY ANCILLARY SERVICE UTILIZATION REVIEW

- a. May be made a part of each graduate physician's assessment file.
- b. May be used in service teaching conferences.
- c. May be reported to committees within BAMC, such as the Hospital Education Committee and Departmental Medical Care Evaluation Subcommittees.
- d. May be used as evidence of instruction in cost containment during internal reviews by the Special Subcommittee to the Hospital Education Committee or external accreditation body visits.

ANCILLARY SERVICES UTILIZATION REVIEW
MEDICAL RECORD AUDIT

TEST _____

Criteria/Indications/Situations for ordering test:

- 1.
- 2.
- 3.
- 4.
- 5.

Appropriate response by physician noting abnormal results:

- 1.
- 2.

#Tests reviewed _____

#Meeting criteria _____

#Referred to physician _____

Initials/Last 4 of Pat	Appropriate	Not Appropriate	Comment
------------------------	-------------	-----------------	---------

- 1.
- 2.
- 3.
- 4.
- 5.

Pattern Identified

Corrective Action

Medical Record Reviewer

Signature _____

Physician Reviewer

Signature _____

C, _____,

Signature _____

Date _____

ATTACHMENT 1

Service _____

Discharge Diagnosis

C = Unnecessary

Check

[illegible]

ANCILLARY SERVICES UTILIZATION REVIEW
PEER REVIEW

Service _____

Patient Data:

Initials/Last Four _____

Age _____

Sex _____

Admission Diagnosis

Discharge Diagnosis

Scoring:

A = Indicated

B = Possibly Indicated

C = Not Indicated

FA = Frequency Appropriate

FI = inappropriate

E = Excess

1 = Inadequate

TESTS

[illegible]

APPENDIX N
PROPOSED ADDITION TO APPENDIX B OF
BAMC MEMORANDUM 40-1,
QUALITY ASSURANCE

PROPOSED ADDITION TO APPENDIX B OF
BAMC MEMORANDUM 40-1, QUALITY ASSURANCE

Ancillary Services Utilization Review. The use of diagnostic tests in the delivery of health services has been shown to consume from 11 to 16 percent of the budget of Brooke Army Medical Center. Service and departmental chiefs should be aware of the potential of over and underutilization as well as inefficient scheduling of these resources. Three forms for assessment of the use of ancillary services tests are shown at _____.

ANCILLARY SERVICES UTILIZATION REVIEW
MEDICAL RECORD AUDIT

TEST _____

Criteria/Indications/Situations for ordering test:

- 1.
- 2.
- 3.
- 4.
- 5.

Appropriate response by physician noting abnormal results:

- 1.
- 2.

#Tests reviewed _____

#Meeting criteria _____

#Referred to physician _____

Initials/Last 4 of Pat	Appropriate	Not Appropriate	Comment
------------------------	-------------	-----------------	---------

- 1.
- 2.
- 3.
- 4.
- 5.

Pattern Identified

Corrective Action

Medical Record Reviewer

Signature _____

Physician Reviewer

Signature _____

C. _____,

Signature _____

Date _____

Service _____

Initials/Last Four _____
Age _____
Sex _____

A = Necessary
B = Possibly Necessary
C = Unnecessary

Admission Diagnosis _____

Discharge Diagnosis

Check

[illegible]

Service _____

Initials/Last Four _____
Age _____
Sex _____

Admission Diagnosis

Discharge Diagnosis

A = Indicated
B = Possibly Indicated
C = Not Indicated
FA = Frequency Appropriate
FI = Inappropriate
E = Excess
I = Inadequate

[illegible]

FOOTNOTES

¹Sharon Von Sell Davidson, PSRO Utilization and Audit in Patient Care (St. Louis: C.V. Mosby Co., 1976), p. 27.

²Michael D. Bromberg, "Planning for Prospective Payment," Federation of American Hospital Review 15 (November/December 1982): 5.

³Texas Hospital Association, Orientation for New Administrators and Administrative Residents, November 1982.

⁴Brooke Army Medical Center, Patient Care Expenses Reports RCS: MED-304(R1) for FYs 1979, 1980, 1981, and 1982.

⁵Davidson, p. 242.

⁶Ibid.

⁷Janice M. Moore, "Utilization Review: The Blue Cross Perspective," Quality Review Bulletin 4 (June 1978): 30.

⁸Davidson, p. 244.

⁹Department of the Army, Medical Records and Quality Assurance Management, AR 40-66 with Change 2 (Washington D.C.: Department of the Army, 1 November 1982), p. 9-7.

¹⁰Joint Commission on the Accreditation of Hospitals, Accreditation Manual for Hospitals, 1983 ed. (Chicago: JCAH, 1982), p. 193.

¹¹"Trend Report: Public Wants Best Health Care Despite High Cost," Hospital Management Quarterly (Fall 1982): 32.

¹²David L. Rothberg and Paul M. Gertman, "The Use of Attitudinal Data for Public Policy: The Case of Unnecessary Hospital Use," Medical Care 19 (January 1981): 47.

¹³Lois P. Myers and Steven A. Schroeder, "Physician Use of Services for the Hospitalized Patient: A Review with Implications for Cost Containment," Milbank Memorial Fund Quarterly 59 (Fall 1981): 481.

¹⁴JCAH Manual, p. 193.

¹⁵Department of the Army, Army Medical Treatment Facilities General Administration, AR 40-2 with Change 1 (Washington D.C.: Department of the Army, 15 July 1981), p. 5-1.

¹⁶Department of the Army, Medical Records and Quality Assurance Management, p. 9-5.

- 17 *Ibid.*, p. 9-1.
- 18 Richard Kahan and Ronnie G. Tobin, "Utilization Review Can Be a Tool for Improvement," Hospitals 52 (16 March 1978): 94.
- 19 R. Heather Palmer and H. Richard Nesson, "A Review of Methods for Ambulatory Medical Care Evaluations," Medical Care 20 (August 1982): 760.
- 20 S. Ann Hunter, "Retrospective Utilization Review as a Focused Method of Evaluation," Quality Review Bulletin 6 (February 1980): 11.
- 21 *Ibid.*
- 22 Kahan and Tobin, p. 89.
- 23 Arch B. Edwards, "Care Level and Timeliness Review--An Approach to Curbing Inappropriate Hospital Utilization," Topics in Health Care Finance 7 (Spring 1981): 47.
- 24 *Ibid.*, p. 50.
- 25 *Ibid.*, p. 53.
- 26 *Ibid.*, p. 52.
- 27 Paul M. Gertman and Joseph D. Restuccia, "The Appropriateness Evaluation Protocols: A Technique for Assessing Unnecessary Days of Hospital Care," Medical Care 19 (August 1981): 855.
- 28 Edward J. Carels and Cheryl Tabatabai, "Increased Utilization of Laboratory Tests and X-Rays: Effect on Quality and Cost of Health Care," Quality Review Bulletin 6 (June 1980): 5.
- 29 *Ibid.* Also H.L. Abrams, "The Overutilization of X-Rays," New England Journal of Medicine 300 (May 1979): 1216.
- 30 David Raymond, "Department Review: A PSRO Approach from the Hospital's Perspective," Quality Review Bulletin 6 (August 1980): 12.
- 31 Elliot J. Sussman, John M. Eisenberg, and Sankey V. Williams, "Diagnostic Services Utilization Review at a University Medical Center," Health Care Management Review 6 (Fall 1981): 66.
- 32 Pamela L. Faulkner, Rosalie Nevick, and Sankey V. Williams, "Many Diagnostic Tests May Be Unnecessary," Hospitals 55 (16 April 1981): 57.
- 33 John M. Eisenberg, "The Use of Ancillary Services: A Role for Utilization Review?" Medical Care 20 (August 1982): 855.
- 34 *Ibid.*
- 35 *Ibid.*
- 36 Thomas S. McConnell et al., "Professional Review of Laboratory Utilization,"

Human Pathology 13 (April 1982): 399.

³⁷ Carol D. McManus et al., "Monitoring Laboratory Services Through Concurrent Review," Quality Review Bulletin 8 (February 1982): 5.

³⁸ Daniel J. Fink, Meika Fang, and Frederic A. Wyle, "Routine Chest X-Ray Films in a Veterans Hospital," Journal of the American Medical Association 245 (13 March 1981): 1056.

³⁹ Jean Gerstein, "Refining a Study Design to Assess Delays in Reporting Radiologic Test Results," Quality Review Bulletin 6 (December 1980): 16.

⁴⁰ Ellis S. Benson, "Initiatives Toward Effective Decision Making and Laboratory Use," Human Pathology 11 (September 1980): 440.

⁴¹ James K. Skipper et al., "Physicians' Knowledge of Cost: The Case of Diagnostic Tests," Inquiry 13 (June 1976): 196.

⁴² Paul F. Griner, "Use of Laboratory Tests in a Teaching Hospital: Long Term Trends," Annals of Internal Medicine 90 (February 1979): 243.

⁴³ E. Wayne Martz and Richard Ptakowski, "Educational Costs to Hospitalized Patients," Journal of Medical Education 53 (May 1978): 383.

⁴⁴ Fulvantiben Mistry and Joyce S. Davis, "Teaching Efficient and Effective Utilization of the Clinical Laboratory," Journal of Medical Education 56 (April 1981): 356. Also Mohan L. Garg, Warren M. Kleinberg, and Werner A. Gillebe, "A Course on Cost and Quality," Quality Review Bulletin 4 (March 1978): 22.

⁴⁵ John M. Eisenberg and Sankey V. Williams, "Cost Containment and Changing Physicians' Practice Behavior: Can the Fox Learn to Guard the Chicken Coop?" Journal of the American Medical Association 246 (13 November 1981): 2195.

⁴⁶ Albert R. Martin et al., "A Trial of Two Strategies to Modify the Test-Ordering Behavior of Medical Residents," New England Journal of Medicine 303 (4 December 1980): 1330.

⁴⁷ "New Law Will Strengthen the Positive Aspects of the Peer Review System, Durenberger Believes," Federation of American Hospitals Review 15 (November/December 1982): 22.

⁴⁸ McConnell et al., p. 400.

⁴⁹ Wayne W. Daniel, Biostatistics: A Foundation for Analysis in the Health Sciences, 2nd ed. (New York: John Wiley & Sons, 1978): 402.

⁵⁰ American Medical Association, '82-'83 Directory of Residency Training Programs Accredited by the Accreditation Council for Graduate Medical Education (Chicago: American Medical Association, 1982), p. 10.

⁵¹ *Ibid.*, p. 13.

⁵² Brooke Army Medical Center, Graduate Medical Education Program Institutional Agreement (Fort Sam Houston, Tex.: Brooke Army Medical Center, 1 July 1982).

⁵³Brooke Army Medical Center, Transition to Practice Questionnaire (Fort Sam Houston, Tex.: Brooke Army Medical Center, May 1983).

⁵⁴Brooke Army Medical Center, Hospital Boards, Committees, and Councils Memorandum 15-1 (Fort Sam Houston, Tex.: Department of the Army, 5 January 1983).

⁵⁵Brooke Army Medical Center, Graduate Medical Education Program Institutional Agreement, p. 3.

⁵⁶Thomas S. McConnell et al., "Professional Review of Laboratory Utilization," Human Pathology 13 (April 1982): 399.

BIBLIOGRAPHY

Books

- American Medical Association. Utilization Review: A Handbook for the Medical Staff. Chicago: American Medical Association, 1968.
- Daniel, Wayne W. Biostatistics: A Foundation for Analysis in the Health Sciences, 2d ed. New York: John Wiley & Sons, 1978.
- Davidson, Sharon Von Sell. PSRO Utilization and Audit in Patient Care. St. Louis: C.V. Mosby Co., 1976.
- Raffel, Marshall W. The U.S. Health System Origins & Functions. New York: John Wiley & Sons, 1980.
- Williams, Stephen J. and Torrens, Paul R. Introduction to Health Services. New York: John Wiley & Sons, 1980.

Periodicals

- Abrams, H.L. "The Overutilization of X-Rays." New England Journal of Medicine 300 (May 1979): 1213-1216.
- Benson, Ellis S. "Initiatives Toward Effective Decision Making and Laboratory Use." Human Pathology 11 (September 1980): 440.
- Borchardt, Peter J. "Nonacute Profiles. Evaluation of Physicians' Nonacute Utilization of Hospital Resources." Quality Review Bulletin 7 (November 1981): 21.
- Bromberg, Michael D. "Planning for Prospective Payment." Federation of American Hospital Review 15 (November/December 1982): 5.
- Burrows, S., Schiffman, R., and Roberts, B. "Conducting a Medical Laboratory Audit for Stat Laboratory Orders." Pathologist 34 (1980): 517-519.
- Carels, Edward J. and Tabatabai, Cheryl. "Increased Utilization of Laboratory Tests and X-Rays: Effect on Quality and Cost of Health Care." Quality Review Bulletin 6 (June 1980): 5.
- Cofer, Jennifer I. "Implementing Audit in a University Hospital," Quality Review Bulletin 4 (March 1978): 20.
- DeCampo, John and Petty, Peter G. "How Useful is the Skull X-Ray Examination in Trauma?" Medical Journal of Australia 2 (15 November 1980): 553.

- Edwards, Arch B. "Care Level and Timeliness Review--An Approach to Curbing Inappropriate Hospital Utilization." Topics in Health Care Finance 7 (Spring 1981): 47.
- Eisenberg, John M. and Williams, Sankey V. "Cost Containment and Changing Physicians' Practice Behavior: Can the Fox Learn to Guard the Chicken Coop?" Journal of the American Medical Association 246 (13 November 1981): 2195.
- Eisenberg, John M. "The Use of Ancillary Services: A Role for Utilization Review?" Medical Care 20 (August 1982): 849.
- Enlow, Ronald A.; Hodak, John A.; Pullen, Karen W.; Bedworth, David D.; Moor, William C.; Reahard, Thomas M.; & Milligan, Virginia A. "The Effect of the Computed Tomographic Scanner on Utilization and Charges for Alternative Diagnostic Procedures." Radiology 136 (August 1980): 413.
- Faulkner, Pamela L.; Nevick, Rosalie; & Williams, Sankey V. "Many Diagnostic Tests May Be Unnecessary." Hospitals 55 (16 April 1981): 57.
- Fink, Daniel J.; Fang, Meika; & Wyle, Frederic A. "Routine Chest X-Ray Films in a Veterans Hospital." Journal of the American Medical Association 245 (13 March 1981): 1056.
- Finkelstein, Stan N. "An Approach to Studying the Cost Behavior of Changing Utilization of a Hospital Laboratory." Human Pathology 11 (September 1980): 435.
- Garg, Mohan L.; Kleinberg, Warren M.; & Gliebe, Werner A. "A Course on Cost and Quality." Quality Review Bulletin 4 (March 1978): 22.
- Gerstein, Jean. "Refining a Study Design to Assess Delays in Reporting Radiologic Test Results." Quality Review Bulletin 6 (December 1980): 16.
- Griner, Paul F. "Use of Laboratory Tests in a Teaching Hospital: Long Term Trends." Annals of Internal Medicine 90 (February 1979): 243.
- Hall, F.M. "Overutilization of Radiological Examinations." Radiology 120 (August 1976): 443.
- Hardwick, David F.; Morrison, J. Ian; Tydeman, John; Cassidy, Paul A; & Chase, William H. "Laboratory Costs and Utilization: A Framework for Analysis and Policy Design." Journal of Medical Education 56 (April 1981): 307.
- Hunter, S. Ann. "Retrospective Utilization Review as a Focused Method of Evaluation." Quality Review Bulletin 6 (February 1980): 11.
- Kahan, Richard and Tobin, Ronnie G. "Utilization Review Can Be a Tool for Improvement." Hospitals 52 (16 March 1978): 89.
- Martin, Albert R.; Wolf, Marshall A.; Thibodeau, Lawrence A.; Dzau, Victor; & Braunschweig, Eugene. "A Trial of Two Strategies to Modify the Test-Ordering Behavior of Medical Residents." New England Journal of Medicine 303 (4 December 1980): 1330.
- Martin, Russell D. "A Method for Documenting and Displaying Problem-Focused Activities." Quality Review Bulletin 7 (April 1981): 24.

- Martz, E. Wayne and Ptakowski, Richard. "Educational Costs to Hospitalized Patients." Journal of Medical Education 53 (May 1978): 383.
- McConnell, Thomas S.; Berger, Paul R.; Dayton, Harvey H.; Umland, Berthold E.; & Skipper, Betty E. "Professional Review of Laboratory Utilization." Human Pathology 13 (April 1982): 399.
- McManus, Carol D.; Smalley, David L.; & Sanders, Donald E. "Monitoring Laboratory Services Through Concurrent Review." Quality Review Bulletin 8 (February 1982): 5.
- Mistry, Fulvantiben D. and Davis, Joyce S. "Teaching Efficient and Effective Utilization of the Clinical Laboratory." Journal of Medical Education 56 (April 1981): 356.
- Moore, Janice M. "Utilization Review: The Blue Cross Perspective." Quality Review Bulletin 4 (June 1978): 29.
- Myers, Lois P. and Schroeder, Steven A. "Physician Use of Services for the Hospitalized Patient: A Review, with Implications for Cost Containment." Milbank Memorial Fund Quarterly 59 (Fall 1981): 481.
- "New Law Will Strengthen System, Durenberger Believes." Federation of American Hospitals Review 15 (November/December 1982): 22.
- Palmer, R. Heather and Nesson, H. Richard. "A Review of Methods for Ambulatory Medical Care Evaluations." Medical Care 20 (August 1982): 758.
- Raymond, David. "Department Review: A PSRO Approach from the Hospital's Perspective." Quality Review Bulletin 6 (August 1980): 11.
- Restuccia, Joseph D. "The Effect of Concurrent Feedback in Reducing Inappropriate Hospital Utilization." Medical Care 20 (January 1982): 46.
- Rothberg, David L. and Gertman, Paul M. "The Use of Attitudinal Data for Public Policy: The Case of Unnecessary Hospital Use." Medical Care 19 (January 1981): 47.
- Skipper, James K., Jr.; Smith, Gary; Mulligan, Jack L.; & Garg, Mohan L. "Physicians' Knowledge of Cost: The Case of Diagnostic Tests." Inquiry 13 (June 1976): 194.
- Sussman, Elliot J.; Eisenberg, John M.; & Williams, Sankey V. "Diagnostic Services Utilization Review at a University Medical Center." Health Care Management Review 6 (Fall 1981): 65.
- "Trend Report: Public Wants Best Health Care Despite High Cost." Hospital Management Quarterly (Fall 1982): 32.
- Zuidema, George D. "The Problem of Cost Containment in Teaching Hospitals: The Johns Hopkins Experience." Surgery 87 (January 1980): 41.

Other

American Medical Association. '82-'83 Directory of Residency Training Programs Accredited by the Accreditation Council for Graduate Medical Education. Chicago: American Medical Association, 1982.

Brooke Army Medical Center. Hospital Boards, Committees, and Councils. Memorandum 15-1. Fort Sam Houston, Tex.: Brooke Army Medical Center, 5 January 1983.

-----Graduate Medical Education Program Institutional Agreement. Fort Sam Houston, Tex.: Brooke Army Medical Center, 1 July 1982.

-----Transition to Practice Questionnaire. Fort Sam Houston, Tex.: Brooke Army Medical Center, May 1983.

Department of the Army. Army Medical Treatment Facilities General Administration. AR 40-2 with Change 1. Washington, D.C.: Department of the Army, 15 July 1981.

-----Medical Records and Quality Assurance Management. AR 40-66 with Change 2. Washington, D.C.: Department of the Army, 1 November 1982.

Janke, Thomas A. How to Manage Practically Anything Systematically. Fort Sam Houston, Tex.: Academy of Health Sciences, 1980.

Joint Commission on Accreditation of Hospitals. Accreditation Manual for Hospitals, 1983 ed. Chicago: JCAH, 1982.

U.S. Army-Baylor University Program in Health Care Administration. Administrative Residency Manual 1982-1983. Fort Sam Houston, Tex.: Academy of Health Sciences, 1982.

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